



FRIDAY, APRIL 12.

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Contributions.

Heavy Freight Engines.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Notwithstanding all that I have read regarding the hauling capacity of engines, and the figures demonstrating that the tractive power is in very close ratio to the weight on the drivers, it has been difficult for me to understand why it was that on the "tea" and "cattle" fast freights between Omaha and Chicago, when I was in that region, the Chicago & Northwestern used 17 in. x 24 in. 8-wheelers, while the Chicago, Burlington & Quincy and the Chicago, Milwaukee & St. Paul used "jacks" or moguls, although the loads were very nearly equal. I think the heaviest trains differed by about two cars on the different lines. I know that the Chicago & Northwestern made the best time. These are matters on which I am not very well posted, and, although the "jacks" are very popular on heavy grades, I am inclined to think that their value on comparatively level lines may be overestimated. V.

[There is, as our correspondent finds, a wide difference in the motive power used on different railroads to do the same class of work, but in the case which he mentions there is not the difference which he supposes. While the Burlington is using the consolidation locomotive, it is only to assist on those divisions where the grades are heaviest. Between Chicago and Omaha, the grades on the Burlington are heavier than those on the Chicago & Northwestern, and at the points where these heavier grades exist the consolidation is needed to haul the trains that are hauled on the comparatively level lines by locomotives of nearly the same type as those used on the Northwestern.]

While there are a few railroad officers who believe in the eight-wheel engine as the best class for heavy freight service, yet there is a large number who have tried the consolidation engine, and know by practical experience that there is an economy in its use in freight transportation. The decrease in the number of train men, and in the number of trains and the centralization of responsibility, are some of the advantages which are to be derived from the use of the more powerful freight engine. We hardly believe that the value of heavy engines on comparatively level lines is over estimated.—EDITOR RAILROAD GAZETTE.]

Steam Hose Couplings.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the problem of steam heating for passenger cars, which is now engaging the attention of railroad men and inventors generally, nothing stands out so prominently requiring the concerted action and uniform adoption of a standard as the arrangement of the main steam pipe at the ends of the cars. This seems to be the first step toward solving the much-discussed question of a standard steam hose coupling.

It has been stated that the necessity does not exist for adopting at this stage of the development of steam heating a standard coupler, for the reason that passenger cars do not leave the roads to which they belong to any great extent, and that it will be better if each road works out the problem according to its own peculiar ideas, irrespective of what its neighbors and the rest of the railroad world are doing. This is only partly true, because at times most railroads haul officers' and foreign passenger cars in their regular trains, and in states where the law does not admit of cars attached to passenger trains being heated by stoves, much confusion and trouble is already being experienced in making steam connections between the cars.

Among the great number of hose couplings which have been invented for the purpose of conveying steam from one

car to another, no two seem to have selected the same starting point on the continuous train pipe, which conveys steam from car to car. Some are arranged for the right hand side facing the car, so many inches to the right of the centre line, and so many inches back of the common coupling line between cars. Some are run from the left side, others have a location peculiar to themselves, under the air-brake hose and signal hose. Or, on the other hand, they may be arranged to pass from car to car with but little sag, and are kept up just under the Janney or Miller couplers.

In a word, the idea seems to have been in getting up the class of couplers which depend upon rubber hose for their flexibility, and are made with both halves similar, to make the location differ at from anything prior to it, with enough alteration of position to render it difficult to unscrew one and attach another of different make without altering the end of the train pipe.

No progress of any account was ever made towards the adoption of a standard automatic draw-bar coupling until the M. C. B. Association settled upon the vertical plane type, the contour lines and the length of barrel. This put the matter in proper shape, and gave a great impetus to the solution of the problem. The construction of hose coupling does not admit of exactly the same treatment, but what can be done is to first settle which is the proper side of the car to place the coupler, and secondly, how far back from the common centre of the cars and how far to the right or left of the longitudinal centre line, and how high from the top of rail should the end of the train pipe be placed. If these points were made standard many different styles of couplers could be used, without disturbing or altering the piping, by simply screwing them to the end of the pipe. The ultimate adoption of a standard could be left for a while, or allowed, according to the law of the "survival of the fittest," to work out its own solution. The problem will be much simplified by uniformity in a few details, such as briefly outlined above.

It appears to be the practice now to use not less than 1½ in. train pipe to insure a full supply of low-pressure steam at the rear car of an average train, and it would be no more than common sense to use a hose and coupling, having a clear opening and area rather in excess of the pipe than much smaller, as some are at present. C.

The Superintendents' Association on Continuous Heating.

We published March 22 a list of 60 questions sent out by the Association of North American Railroad Superintendents, for the purpose of getting information as to the heating of trains from the locomotive. Replies to these questions have been received from 38 roads, and are summarized below. Twenty of these roads use continuous heating systems, and 18 do not. Replies to the first six questions are summarized in the table given below.

The seventh question referred to the method of heating cars when detached from the locomotive. The number of roads using stoves for this purpose was 7, roads using stationary boilers, 7; switch engines, 2; auxiliary heaters, 1. The Boston & Albany and Connecticut River roads state definitely that the locomotive is not allowed to leave the train on the road. On the latter road, at stations where trains lie over night and there are not stationary boilers, there are pipes running from locomotives in the engine-houses to the trains. It may be said, generally, that there is no expression of opinion on this subject from which any conclusion may be drawn other than the inference that in most parts of this country an auxiliary heater must seldom be necessary.

Question 8 referred to details of hot water circulation heated by steam from the locomotive. Five roads reported as having tried such a system. The advantages are that the temperature can be perfectly and quickly controlled, and the heat stored. The Lehigh Valley states that the water becomes fresh and liable to freeze when the engine is detached.

Questions 9 and 10 ask whether continuous heating is considered successful, and if not, why. The answers to these questions are practically unanimous in favor of the system.

SUPERINTENDENTS' REPORT ON CONTINUOUS HEATING.

ROAD.	System		No. of cars equipped.	No. of locomotives equipped.	Daily mileage, steam-heated trains.	Max. number of cars heated on any train.
	Experimented with.	Adopted.				
1. Delaware & Hudson Canal Co....	Sewall. Safety. McElroy.	McElroy.	114	70	145	12
2. Connecticut River.....	Emerson.	Emerson.	41	26	1,148	9
3. N. Y., Prov. & Boston.....	N. Y. Safety. Martin. Gold.	None.	12	10	300	4
4. Staten Island Rapid Transit.....	Gold.	Gold.	39	13	943	6
5. Chicago, Santa Fe & California.....	Houston.	Houston.	94	18	2,626	13
6. Mich. Cen. (Can. & Mich. Midland Div.).....	Martin.	Martin.	164	164	.....	9
7. Clev., Colum., Cin. & Ind.....	Martin.	Martin.	108	61	250 to 500	12
8. Providence & Worcester.....	Martin. Sewall.	None.	(18 Martin 5 Sewall)	7 M. & S.	405 M. 172 S.	4
9. Boston & Albany.....	None.	Martin.	225	80	.....	7
10. New London Northern.....	Sewall.	Sewall.	8	8	372	3
11. Illinois & St. Louis.....	Timlin-Heidinger.	Timlin-Heidinger.	5	2	151	.....
12. Fall Brook Coal Co.....	Martin.	Martin.	24	10	877	4
13. Cheshire.....	Sewall.	Sewall.	12	6	256	4
14. Chic. Rock Island & Pacific.....	Sewall.	Sewall.	96	48	4,040	14
15. Lehigh Valley.....	Sewall. McElroy. Gold. Martin.	Martin.	150 to 175	50	.....	6
16. Boston & Maine.....	Sewall.	Sewall.	52	32	1,254	9
17. Boston, Revere Beach & Lynn.....	System of our own.	Our own.	25	10	639	5
18. Atlanta & West Point.....	Sewall.	None.	0	1	.....	4
19. Rome, Watertown & Ogdensb'g.....	(N. Y. Safety. Martin. McElroy. T. Heidinger. Westinghouse.)	None.	76	33	3,827	7
20. Old Colony.....	Sewall. Gold. Richard.	None.	100	65	.....	6

The difficulties mentioned are, the difficulty of getting a sufficient number of men educated to manage it; occasional failures of the hose connection, trouble in maintaining uniform temperature, and in having the cars warm when the trains are made up. There is little difficulty reported in keeping uniform temperature.

Questions 13 and 14 referred to the pressure maintained in the train pipe. The answers are summarized as follows:

System.	No. of cars.	To warm up.	Running.	At 0°.	At 32°.
Sewall.....	7 to 9	40 to 50	20 to 25	20 to 35	15 to 20
".....	4	40	5 to 10	12 to 20	5 to 10
Martin.....	7 to 12	20 to 30	10	15 to 20	5 to 10
".....	4	15 to 20	10	10 to 20	5 to 10
Gold.....	6	.....	.....	50	25
Houston.....	13	30	.....	20	5
Timlin-Heidinger.....	.....	10	10	10	10
Emerson.....	9	40	10 to 20	5 to 10	3
Boston, R.....	.....	.....	.....	.....	.....
B. & L.....	5	25	.....	15 to 20	4 to 8
McElroy.....	12	40	.....	10 to 15	2 to 5

Question 15 asked for the quantity of water condensed per hour per car. Only four roads answered this question, with the following result: Sewall, 65 lbs. (external temperature, zero to 22 deg.); Timlin-Heidinger, 16½ lbs. (external temperature not given); Martin, 57 lbs. (external temperature about 22 deg.); and Boston, Revere Beach & Lynn, 33 lbs. (external temperature not given). The Old Colony referred the committee to the report of Professor Lanza to the Massachusetts Commissioners, which gave the condensation of the Sewall system at 77 to 92 lbs. per car per hour, with an external temperature of 19 deg. to 32 deg. F.

All but three of the 20 roads use a reducing valve for regulating the pressures in the train pipe. These three use a globe valve, or rely upon the steam gauge in the cab. The cost of fitting up the locomotive with heating apparatus is estimated all the way from \$6 to \$150. Apparently, the figures are made on such widely different bases that they are of no value.

As to the method of protecting the pipes from loss of heat by radiation, most of the companies use asbestos, covered with cloth or canvas. The Delaware & Hudson uses the standard insulated air covering.

In nearly all of the equipments the main pipe is lowest at the ends of cars. The radiating pipe is from 1½ to 2 in. in diameter, and from 200 to 300 ft. per car. The ratio of square feet of heating surface to the cubic foot car capacity is: Maximum, 1 sq. ft. to 30 cu. ft.; minimum, 1 sq. ft. to 22 cu. ft. The radiating pipes are generally somewhat inclined for drainage, although most of those equipping with the Sewall system run the pipes on a level. In many cases each side of the car is piped independently, and can be shut off from the main steam pipe.

There is no agreement as to the question of putting radiating pipes under the seats. Six of the roads reporting use the Baker pipes, and 11 do not. Drip pipes of from ¾ in. to 1½ in. are used from the radiating system, and the valves on steam and drip pipes are generally globe or angle valves in the middle of the car.

Many varieties of traps have been used, but the evidence is chiefly negative. That is, there has been little trouble from freezing, the winter having been mild, and various roads think that better results are obtained with no trap.

The estimates of cost of fitting up a car for continuous heating as given vary so widely as to be of little or no value.

The connections between cars are by means of flexible hose, except where the Martin system is used, in which case the connection is generally metallic. The reports show about as many couplers of one kind as another. No preference is given. The hose is rubber, extra heavy, 20 to 30 in. long, 1½ to 1¾ inside diameter, and 5 or 6 ply. Opinions differ as to whether plain, corrugated or wire-covered inside is the best. The life of hose is reported as varying from ninety days to six months.

In the discussion which followed this report, Mr. ROYCE, (C. R. I. & P.), stated that the experience of his road on nearly 4,000 miles was to the effect that all difficulties could be overcome and a safe system of heating be secured at very much less expense than by any former system, provided they could get over one difficulty, the only one he had found, to wit, the education of the large number of trainmen and yard-

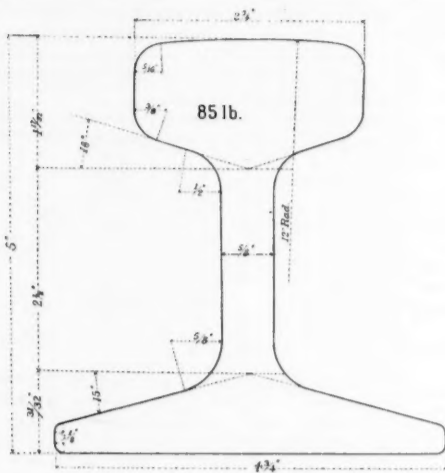


Fig. 1.

Chicago, Burlington & Quincy, Delano Section.

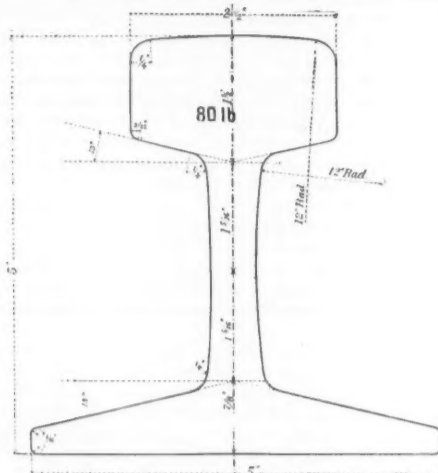


Fig. 2.

Michigan Central.

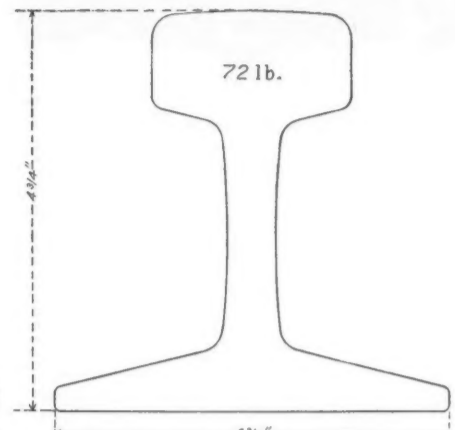


Fig. 3.

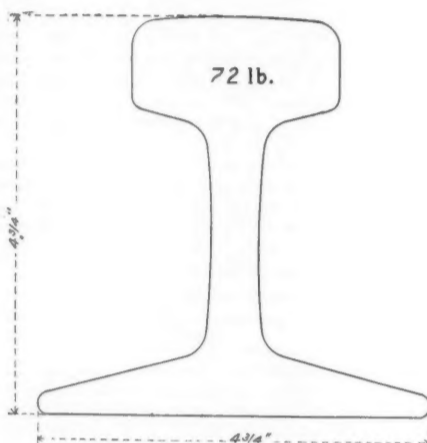
Chicago & Northwestern.
Radius of crown, 12 in.; radius of upper corner, 5/8 in.

Fig. 4.

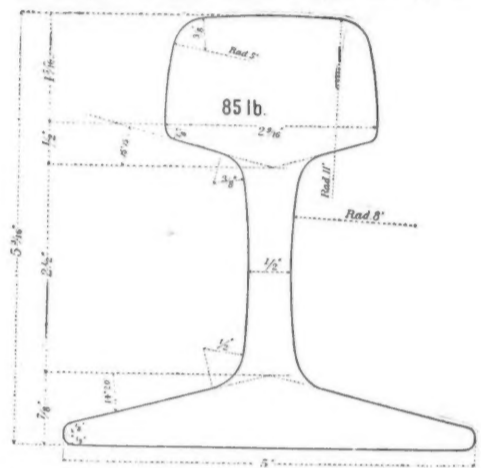
Milwaukee, Lake Shore & Western
Radius of crown, 12 in.; radius of upper corner, 5/8 in.

Fig. 5.

Chicago, Burlington & Quincy, McClure Section.

SOME RECENT RAIL SECTIONS.

Scale, one-half size.

men necessary. A considerable degree of mechanical skill was required. Much of the apparatus is hidden where men cannot readily see it, and there is much that they must learn and know in order to attend to heating satisfactorily. This takes time.

In answer to inquiry, Messrs. FLEMING and DIVINE stated that the Pullman vestibule train running to and from Florida, over their road, was fitted with an engine in the baggage car for running the electric light of the train. The steam is taken from the locomotive boiler, and the man in charge of the stationary engine demands about 80 lbs. pressure. This, with the steam used for heating at times, caused quite a drain on the engine, but it had not prevented making regular time.

Mr. ALLEN, of the Elmira, Cortland & Northern, stated that his success with the Martin heater had been perfectly satisfactory. His trains consist of only three or four cars, and the difficulty had been to keep them cool enough. The saving in coal was a very marked advantage.

Mr. BRADLEY, of the West Shore: Our entire equipment is fitted with the Martin, except a few cars, on which the McIlroy is used. In consequence of the very mild winter, the heating system has not been fairly tested. Concerning amount of steam used, we find that a 66 mile run, which our engines formerly made without taking water, is now too long for them.

Mr. BLEE: We have used the Martin system five years. The highest number of cars that we have heated was 13. Any good device requires attention. If the brakeman lets out the water of condensation every 30 or 40 miles, all will run smoothly. In response to an inquiry, Mr. Blee stated that on a long train a trap would not always let the condensed water out. It is useless to put on this or any other heater without instructing the men. We fitted up an engine and three cars as an instruction train, and taught school for two weeks. Subsequently an instructor was put upon the road for six weeks, his attention being given in the course of that time to all the trains. The Lake Shore & Michigan Southern pursued the same plan. The chief desideratum now is to educate the average colored porter, who loves a high temperature, to refrain from roasting passengers alive while they are asleep.

Mr. MORFORD: As to the amount of steam taken, I do not find any one who has made any conclusive experiments. In the first place we did not even know how much water was evaporated per pound of coal before heaters were put on. During the past winter, when it was quite cold, one of our heavy trains lost considerable time. The runner complained that this was on account of steam used for heating, and to remedy the difficulty one engine was fitted with a pipe by which the steam for heating (the Martin system) was taken from the exhaust pipe just outside the steam-chest. This has worked satisfactorily with trains of 12 cars for the past three months. Mr. Morford was unable to say how the back pressure on the cylinder was affected. The size of the pipe is 3/8 in., and the cost of fitting up, \$3.

Mr. FLEMING: What we need in the South, from May 1 to Dec. 1, is some means of artificially cooling cars. During that part of the year our interest in heating systems is not lively.

"Balanced" Rail Sections.

Some months ago (Dec. 7, 1888) we published a drawing of the 80-lb rail section recently adopted by the Michigan Central. The same section is shown again in this issue (fig. 2), together with three others which illustrate the tendency toward smaller heads and thicker flanges, of which we have had frequent occasion to speak. These are all engraved to a scale of one-half. The first departure from the 56 and 60 lb. section was characterized by heavy heads, the flanges and webs being but little increased in weight. The results with the heavier sections have been disappointing. They have been found so much softer than the light rails which immediately preceded them, or so much more liable to splits arising from defects of structure, that the service obtained from them has been sometimes not only relatively, but absolutely, less than that got from light rails, un-

der the same traffic. The favorite idea now is that the big-headed rails cannot be so well made as those in which the metal is more uniformly distributed, and, for reasons that we have frequently given, we think that in this idea is to be found the solution of many of the troubles which rail makers and users now have.

Mr. J. D. Hawks, Chief Engineer of the Michigan Central, has, as our readers well know, long held the opinion that the poor quality of recent heavy rails is due much more to mechanical errors in manufacture than to poor material, and especially to rolling the head too hot. Before finally adopting the design for his new 80-lb. rail he procured drawings of actual or proposed sections from various railroad engineers and rail makers. The section adopted, shown in fig. 2, is the result of a comparison of these sections, and is not greatly modified from a section proposed by the North Chicago Rolling Mills.

Recently the Chicago & Northwestern has adopted a section, shown in fig. 3, which has the same general characteristics. The same may be said of fig. 4, which has been adopted by the Milwaukee, Lake Shore & Western.

The Chicago, Burlington & Quincy having had difficulties similar to those experienced on the Michigan Central, during 1888 instructed their rail inspector, Mr. Delano, to make a tour of the rail mills of the United States and obtain all the information possible relating to the manufacture of rails, with a view to suggesting a section in which the material would be so disposed as to give the rail a maximum life and a maximum uniformity. As a result of Mr. Delano's inspection, the section shown in fig. 1 was proposed, and 1,000 tons of rails of this design have been ordered, together with 1,000 tons, shown in fig. 5, which is a section recommended by Mr. McClure, Chief Engineer of the Chicago, Burlington & Quincy. The comparative wear and uniformity of the rail sections shown by fig. 1 and fig. 5 will be a matter of great interest, for the designs are based upon entirely different theories of rail wear.

The differences in the general characteristics of figs. 1, 2, 3 and 4, and those of fig. 5, are principally in the distribution of metal. A comparison of figs. 1 to 4 with fig. 5 will show that a larger amount of material is placed in the head in case of fig. 5, while in figs. 1 to 4 the flange and head have nearly the same amount of material. The following are the exact proportions:

	Head. Per cent.	Web. Per cent.	Flange. Per cent.
Fig. 1	41.00	21.46	37.54
Fig. 2	42.36	20.92	36.72
Fig. 3	40.63	22.74	36.59
Fig. 4	41.00	22.78	36.22
Fig. 5	47.51	18.95	33.54

The principal difficulties to be met in rolling a rail of the section shown in fig. 5, are as follows:

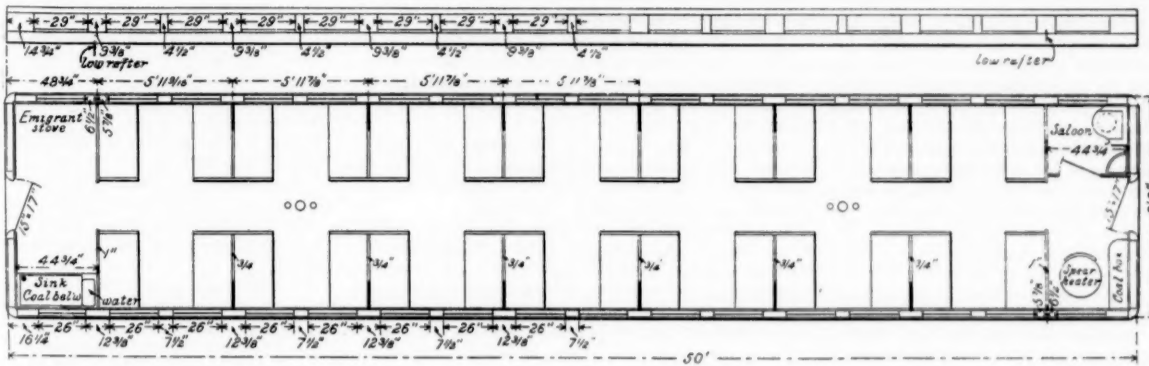
First. The extreme edge of the flange cools while the head is at a white heat. This induces: (a) tearing of the flanges of the rails by the rolls and increases the number of second quality rails; (b) crookedness in the direction of the height of the section—this is the result of the shrinkage of the head after the flange has cooled; and results in: (c) an increased amount of labor in straightening the crooked rails, and (d) an increased injury to the rail during the straightening process. This process gives to the rail short crooks, and at the points where they are "gagged" there are indentures which invite fracture.

Second. The rail which has a large amount of material in the head will necessarily be softer in that part, because it has to be removed from the rolls while still at a much higher temperature than the flange, and the material is not compacted by so much rolling.

These difficulties are, to a great extent, removed in figs. 1, 2, 3 and 4, and the thick flange remains hot nearly as long as the head. Therefore, it is expected that rails of this section can be rolled much harder on the top surface than those having more material in the top. The end sought in this design is a hard and close-grained rail head with a neutral material in the flange. The difficulty with the section shown in fig. 5 is stated to be that the reverse of the foregoing may be true, the head of the rail being soft while the flange is hard and liable to be fractured by rolls, producing second quality rails.

Mr. E. C. Potter, Vice-President of the North Chicago Rolling Mill Company, has devoted much attention to the production of rail sections, which will be of such form as to enable the rolling mills to meet the specifications and furnish rails which are perfect in structure and have hard tops, and the sections shown here embody many of his suggestions.

Rail makers prefer sections in which the width of the base is less than the height of the rail, the wide base being subject to the above-mentioned difficulties. Such sections as those shown by figs. 1 to 4, in which the material in the base is nearly the same as that in the head, are called by rail makers "balanced" sections, and they anticipate much less difficulty with them in producing a satisfactory, uniform and hard top rail which will require less straightening and thus have fewer gag marks, and be, therefore, less liable to fracture in service. To support the claim for the superiority of the class of section shown by figs. 1 to 4, rail makers call attention to the superior durability of the old 80-lb. section, in which the base and head have nearly the same amount of material. The success of the new rail section on the Michi-



gan Central has been gratifying, and all new rails will hereafter be made of the "balanced" section. The result of the trials of the 1,000 tons of each kind on the C., B. & Q. will be watched with much interest.

Colonist Sleeping Car.

The Colonist sleeping car, which we illustrate, shows the latest design as built for the Manitoba by the Barney & Smith Manufacturing Co., of Dayton, Ohio. The cuts show the floor plan and arrangement of berths.

The interior finish of these cars is all in hard wood and is finished as near the natural color of the wood as possible.

The bunks are hinged in the usual manner for sleeping cars and supplied with bunk-pulleys and chains and with the device shown on the section partitions for holding the bunk down. The open work between the sections is of heavy steel wire, which admits of perfect ventilation through the car.

The seat and the back are hinged together and drop to form a full length bunk as shown in the engraving.

These cars are mounted on four-wheel trucks furnished with 42-in. No. 1 Krupp steel tire wheels with wrought iron centres, supplied with Miller platforms and Westinghouse air brakes.

Referring to the floor plan, it will be seen that there is a large sink in the floor opposite the stove, with water tank on end, which extends through the roof of the car for the purpose of filling. The emigrant stove, shown on the plan, is a wrought-iron range with all conveniences for cooking, etc.

Tide-Water Terminals of the Southern States.

BY LEWIS M. HAUPT.

(Continued from page 178.)

THE ATLANTIC PORTS.—Passing now to the entrance of the great Southern bays, we find the normal depths over the bars which barricade all the inlets varying from 7 to 21 ft. at mean low water, while the main tides also vary according to the distances from the outer capes of Hatteras and Florida, reaching a maximum at Jekyll's Island, midway between them, of 7.4 ft.

St. Augustine.—At St. Augustine the survey of 1887 shows but 7 ft. as the minimum depth in the channel, but close beside it there are to be found only 4 ft. on the shifting crest of the bar. It is proposed to improve by the convergent jetty system (1,600 ft. apart at mouth) at an estimated cost of \$1,467,888.25. This does not include any dredging, which would be necessary to make and maintain a channel.

Commerce: Freight received by schooner (1 year)..... 15,659 tons.

Amount of exports..... 8,764 "

Capacity of lumber mills, 16 million feet (B. M.) per year.

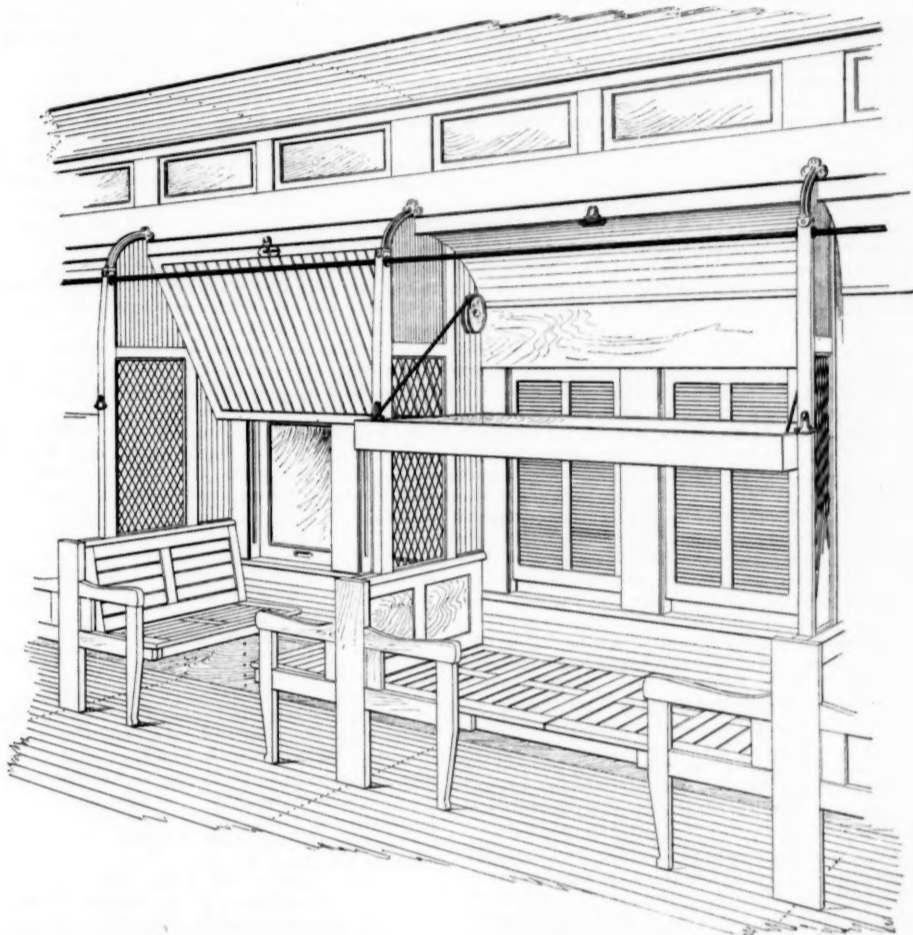
It is stated by the Board of Trade that a canal from this point to the mouth of the Withlacooche River would be the shortest across the state, 110 miles, and have but 32 miles of cutting.

Jacksonville near the mouth of the St. John's River, Fla.—Here terminate the Florida Railway & Navigation Co.'s lines which extend across the state to Cedar Keys and connect at Chattahoochee with the Louisville & Nashville. Efforts have been made for ten years past to increase the crossing over the bar at the mouth of the St. John's from the normal depth of about 6 ft. to 15 ft., "by the contraction of the stream by two long jetties starting from the opposite shores of the entrance and converging until near their outer extremities on the bar they shall be 1,600 ft. apart. . . . The estimated cost of this improvement is \$1,306,409." The jetties were to be built of log and brush mattresses, properly ballasted. Their aggregate length as built to June 30, 1888, is 13,252 ft. or over 2 1/2 miles. The log mattresses were unsatisfactory, producing undercurrent.

"So far the action has been to push the sea contours of the bar closer together and farther out. . . . Excepting on the bar, the changes in the contours since July, 1887, have not been very great. . . . The old channel south of the south jetty has continued to sand up. The shoaling of the middle ground beyond the mouth of the river, where the main channel divides into the channels following the north and south jetties, has continued, until now the least depth here is less than in any part of the ship channel. The flow along the north jetty crosses the line of the jetty and gains deep water through the false channels, each 500 ft. wide and from 6 to 7 ft. deep. The ship channel along the south jetty has opened through the bar with an average width of 500 ft. and a least depth of 13.2 ft. . . . Until the very rapid changes, caused by the opening of the channel between the jetties, have ceased and a somewhat normal condition shall have been re-established, deductions as to the stability of the deep channel across the bar cannot be fairly made."

These extracts will give a brief idea of the effects produced by the jetty works at this site, where they have received careful and intelligent supervision from the engineers in charge, yet there are certain other effects shown by the charts and

* Report Chief of Engineers for 1888.



COLONIST SLEEPING CAR—ST. PAUL, MINNEAPOLIS & MANITOBA RAILWAY.

Built by BARNEY & SMITH MANUFACTURING CO., Dayton, O.

profiles that indicate very strongly even in the formative stage that the ultimate result will merely add another instance to the record of centuries as to the unsatisfactory action of the jetty system. These are the change in the form of the profile on the outer slope of the bar from a long convex curve to a short concave one, showing a rapid extension seaward of the bar's crest, to nearly half a mile; a considerable increase of deposit in the groins outside of the jetties indicating an advance of the low-water line towards their extremities; the subsidence of the outer end of the south jetty to below the original bottom line, showing lack of stability and the deep hole extending to 51.6 ft. depth at the point of incidence of the ebb stream against the inshore flank of the south jetty, as evidence of violent reaction and loss of energy due to the too great deflection of the stream at this point, through an angle of about 34 deg.

The increase of depth in the channel is undoubtedly encouraging, but so soon as the fore-shore has advanced to the extremities of the jetties (and already there are bars there bare at low water), the improvement in the channel may be expected to disappear from wave and current action, and the jetties must be extended. True, this work is not completed, but like most of the works of this class it is tentative and awaiting appropriation. The commercial interest of these several ports are so important that if a single instance of the successful adaptation of the jetty system to tidal harbors on alluvial coasts in the United States could be pointed out, it is believed the money would not long be withheld for their improvement.

Fernandina (Cumberland Sound).—In its improved condition the depth over the bar, at mean low water, varied from 11 to 12.5 ft. The mean tide is 5.9 ft. The plan of improvement is that approved in 1879 and consists in two low jetties, composed of rip-rap stone with a mattress bearing whenever a dismissible, resting upon a foundation mattress of logs, or logs and brush, extending seaward across the bar, so that the ends will be parallel to each other and from 3,000 to 3,500 ft. apart, or such distance as may hereafter be deemed necessary. These jetties were intended to establish a low-water channel across the bar not less than

from 20 to 21 ft. in depth. The cost of improvement was estimated at \$2,071,023.

Work on the north jetty was commenced in June, 1881 and suspended in March, 1883. The foundation course is 7,372 ft. in length (about 1 1/4 miles).

The south jetty is nearly 2 miles long, but both are in an incomplete condition, and almost entirely submerged. The total expenditures to July 1, 1887, on both jetties, have been \$306,782.04. The jetties are reported in good condition. No material changes have taken place in the bar channel during the year. There are about 12 ft. of water over the crest of the bar, which has been moved seaward.

"The improvements of the entrance to Cumberland Sound have scarcely been begun. . . . The appropriations heretofore made have been entirely inadequate to an economical and advantageous prosecution of the work of improvement. The most satisfactory results can not be obtained with expenditures during the next fiscal year of less than \$1,000,000." The amount estimated to complete the existing project is \$1,591,023.

The total exports and imports are valued at \$5,750,856. This port is the terminus of the Florida Railway & Navigation Company's lines.

Brunswick Harbor, Ga.—The present project is an enlargement of the plans approved in 1880. In Brunswick River there are low-water depths of from 4 to 6 fathoms. Over the shoal in front of the city there was a depth of only 1 1/2 fathoms. The mean rise and fall of tide is 6.8 ft.

Training walls of palmetto cribs and mattress work have been built, and cuts have been dredged at various times from 80 to 100 ft. in width, and from 14 to 15 ft. in depth, across the shoal. The material taken out aggregated 120,502 cu. yds. The total expenditures to July 1, 1888, were \$92,463.27. At the close of last year the least depth was 14 ft. It is now only 11.5, the channel having narrowed and shoaled in some places more than 4 ft. Great shoaling has also taken place at certain points along the city wharves.* No work was done from lack of funds.

Total value of commerce \$6,937,439, having more than doubled in one year. "Large docks are being built by the

* Report Chief of Engineers, 1888.

railroads, and there is every prospect of heavy cotton shipments during the coming year." The shipments during the past year were nearly 37,000 bales. This is one of the points at tide-water reached by the Richmond and West Point Terminal, as well as by the Plant System. It is approached through St. Simons Sound, one of the numerous inlets which indent this portion of the coast, where the minimum depth of the water over the bar is 14 ft. This, with a mean tide of 6.8 ft., gives for mean high water 20.8 ft., which is ample for the present coasters drawing only about 15 ft., but not for foreign "tramps."

The Richmond and West Point Systems.—The other tide-water terminals of this system are at Savannah and Port Royal, the latter being the deepest entrance along the southern bay. The northern termini at Richmond and Washington, being at some distance from the sea, are not advantageously situated, and hence the extensions to West Point and Norfolk to enable the company to work to advantage its lines from three great chains stretching around in concentric arcs nearly parallel with the coast, and at intervals of about 100 miles apart, with numerous laterals interlacing the systems and connecting them with the sea. The most northern chain starts from Memphis and passes eastward along the valley of the Tennessee, through Mississippi, Alabama and East Tennessee, to Bristol, Va., where it connects with the Norfolk & Western. The middle chain, starting from Greenville, on the Mississippi, extends eastward through Birmingham, Atlanta, Spartanburg, Charlotte, Greensboro and Danville to Richmond and West Point, or via Lynchburg to Washington, passing en route through the rich and picturesque mountain regions of the Appalachian chain. The southern link, starting from Mobile, on the Gulf, stretches out through Selma, Montgomery, Columbus, Macon, Augusta and Columbia, uniting with the Central trunk at Charlotte, N. C. The mileage of this company will aggregate 6,922.4 miles. An extension is now under construction to Norfolk, Va., one of the most capacious harbors on the Southern coast.

Savannah, Ga.—For more than 150 years this has been recognized as a good harbor, and the records of early navigators show that it has been steadily deteriorating. It was the objective point of the first ocean-going steamboat, the "Savannah," which left New York in 1820, and carried wood for fuel. The river has been considerably improved between its mouth and the city by the removal of wrecks, snags and other obstructions, by the construction of dykes and wing-dams, and by dredging; and since the adoption of the plan, in 1873, aiming at securing 22 ft. of water from the city to the sea, \$1,032,000 have been expended.

In 1887 the project was enlarged to include a 28-ft. channel, with other modifications, for which the estimated cost is \$6,660,000.

The commerce of the port is large, and has kept pace with the improvements in the channel, being valued at \$105,000,000. The principal article is cotton, of which 803,826 bales of all grades were handled. The total weight was 380,796,439 lbs., or about 474 lbs. per bale, and the value \$36,147,996. The depth over the bar is about 20 ft., and the mean rise of tide 7 ft.*

Port Royal Inlet.—This entrance being but a few miles north of Savannah and having no custom house or other existing institutions for large commercial transactions has yielded its great natural advantages to the superior attractions of its rival in another state. The peculiar form of the inner basin and the relatively great range of the tide have operated to make this one of the best inlets along the coast. The normal low-water depth is 21 ft. and the tidal fluctuation 7, giving 28 ft. at mean high water with rail facilities within a few miles of the coast. A survey was made of this port about ten years since but it was not found to require any improvements so that we have here the paradox of a natural deep-water channel of ample capacity ignored by commerce which has been diverted by other considerations to a harbor where even an expenditure of over six millions of dollars will not make as capacious, as safe nor as accessible as that at this point. This is merely an instance of how natural advantages may be outweighed by vested interests.

Charleston Harbor.—About 50 miles to the northeast lies Charleston, which is also one of the oldest and most celebrated of our Southern ports. But it is unfortunately obstructed by one of the worst bars to be found in many miles. The normal low-water depth on the bar is but 12 and the tide 5.1 ft. Two submerged, converging jetties have been partially built since 1878, when they were approved with the view of obtaining 21 ft. over the bar, and 85,549 cubic yards were dredged from between their extremities in 1885, but "without producing any marked effects." The works to July 1, 1888, have cost \$1,482,500, and the amount estimated to complete is \$1,525,000. Although the rates of insurance and freights have decreased, "these gratifying results cannot be ascribed to any improvement thus far made by the Government." The bar, channels and shore line continue moving to the south and west. The problem here has received mature study, and the failure to secure any improvement from the half-finished jetties is sufficient to prove the defects of the method which is not adopted to meet the prevailing physical conditions.

It is believed that with less than half of the estimated cost of this work judiciously applied very substantial improvements could be effected.

Large appropriations unwisely expended will only result in further disappointment and injury to the entrance.

Charleston is the terminus of the Plant System 1,029 miles, The Atlantic Coast line (840 miles) and the South Carolina railroads (260 miles). The latter connects at Columbia with the Richmond terminal, thus bringing many thousands of

miles into connection with this port, whose most urgent need is a deep-water outlet to the sea. The competing lines radiating from Charleston, north, south and west give it exceptional facilities by rail and there is nothing standing between her and a greatly increased commercial prosperity, but the sand on the bar.

The Charleston, Cincinnati & Chicago railroad, now building by the Massachusetts & Southern Construction Company, will still further emphasize the importance of securing a better channel at this port.

A peculiar experience of great value, as indicating the proper remedy to be applied to these problems, occurred on the Charleston bar during the war. Wishing to obstruct the entrance still further and blockade this port, thirteen vessels were scuttled in the channel, crossing the bar, with the unexpected result of opening two new channels, one on either flank of the obstruction. That to leeward having an increased depth of two feet. This was due to the protection afforded the ebb currents by this barrier to the sand traveling southward, and indicates the result that may be expected from a single barricade of proper form placed in suitable position.

The conclusions to be drawn from the experience thus far, at the various entrances mentioned, are that neither dredging nor jetties are satisfactory means of opening and maintaining channels across the drift bars which obstruct all our harbors, and that much better results would be secured by a single high wave-breaker and sand-arrester placed where the action of the flood resultant is the greatest and so arranged as to control and regulate the ebb currents for scouring off the crest of the bar. This plan would cost about half that of the present projects, and for these southern ports would effect a saving of about twelve millions of dollars with every assurance of better results.

Under the existing provisional method of conducting river and harbor improvements, the government will doubtless continue the jetty system, to which it is committed, until the parties at interest, realizing the uncertainties, expenses, delays and injuries resulting therefrom, shall bring their influences to bear in forwarding the organization of a department of Public Civil Works, as outlined in Senate bill No. 1448, for the more rapid and effective treatment of these important problems.

Association of North American Railroad Superintendents.

The meeting of this association was called to order by President C. S. Gadsden, at 46 Bond street, New York City, Monday morning, April 8, about 30 members being present. President Gadsden, in welcoming the members, said, in part: The association now has 220 members, representing 180 roads. Experience seems to be conclusive that meetings in other cities than New York is disadvantageous. Few Eastern men have attended the meetings in the West, while comparatively few Western men have been gained. Until the association has been firmly established in the East by the earnest efforts of its members, it seems best to continue to meet in New York. The association should have rooms in New York, which should be headquarters for all members visiting the city. With a local habitation and a name, and the association formally established, its influence would be felt in remote localities. The investigation of railroad appliances by the association has been criticised, such work being claimed to belong properly to the machinery and roadway associations. This will scarcely be conceded by those whose duties require them to have an intimate acquaintance with all improvements in such appliances. There are, however, many subjects belonging strictly to the administrative department which invite our inquiry. Discipline of the several departments might be examined, and discussion of the various codes taken up, in the hope of arriving at comparative uniformity and a consequent reduction of the friction between employers and employes.

Forty-six new members were elected to the association, and the annual election of officers resulted as follows (re-elections are indicated by a *): President, C. S. Gadsden* (Charleston & Savannah); First Vice-President, L. W. Palmer* (N. Y. & N. E.); Second Vice-President, J. B. Morford* (Michigan Central); Third Vice-President, Waterman Stone (Inter-state Consolidated Rapid Transit, Kansas City); Secretary, C. A. Hammond, Boston, Mass. (B. & R. B. & Lynn); Treasurer, R. M. Sully* (Petersburg, Va. (Petersburg R. R.)).

Executive Committee: The President, *ex officio*; C. W. Bradley* (West Shore); R. G. Fleming* (Savannah, Florida & Western); K. H. Wade (Wabash); R. Blee (C. C. & I.).

Committee on Roadway: J. B. Morford*, S. Keeler (F. & P. M.), I. D. Barton (Long Island).

Committee on Machinery: G. W. Beach* (N. Y., N. H. & H.); J. F. Divine (Atlantic Coast Line); Albert Allen (Elmira, Cortland & Northern).

Committee on Transportation: Robert Blee* (C. C. & I.), J. M. Metheany (Grand Rapids & Indiana), D. J. Chase (Chicago, Santa Fe & California).

The committee appointed at the St. Louis meeting to consider the relations of this association to the Time Convention, and to prepare an address on the subject to be presented to that body, made a report. This report was referred to a committee consisting of Messrs. Gadsden, Bradley, Myers and Palmer, with instructions, to present this address to the Executive Committee of the Time Convention.

The Treasurer's report was received and accepted. The Secretary was authorized to confer with the Executive Committee and to submit to members, by printed circular,

proposed amendments of the constitution, and was instructed to have printed 500 copies, with a revised list of members. The Roadway Committee reported that in response to the \$50 prize offered by the Association last October three papers had been sent in; but as others were promised if an extension of time could be granted, the committee had extended the time to May 1. This was approved by the meeting. The report of the Committee on Machinery (which was accepted) consisted in a valuable mass of facts concerning continuous steam heating on about twenty roads. This report, with the discussion upon it by Messrs. Beach, Royce, Turner, Fleming and others, will be found in another column.

At the afternoon session a communication was presented from E. E. Russell Tratman on the "Improvement of Track," discussing chiefly rail sections, rail fastenings, heavy rails and metal ties. The paper was read and referred to the Committee on Roadway.

There was considerable desultory discussion concerning the use of two short blasts of the whistle as an answer to a signal given by another train or a flagman, the experience of some members being that this signal having been so long and widely used to indicate "let off brakes," it is from force of habit misinterpreted by brakemen and causes trouble. A heavy freight train entering a yard on a down grade needs to be held very carefully, and if at a critical moment the engineer acknowledges some signal and the brakemen let off the brakes the speed may elude control sufficiently to cause a collision or derailment.

President Gadsden read the following paper on

DISCIPLINE.

The maintenance of proper discipline is as necessary to the proper operation of railroads as it is difficult of application and distasteful to the Superintendent called on to exercise it. So long as the necessity exists for the employment of the "personal equation," as it is called, in the service of railroads, laws must be framed for its government, and punishment must follow their violation. The problem is to measure the degree of punishment suitable to the offense; to correct the violation of law without doing greater harm to the system. Personal government without fixed rules for guidance will tend either to unusual severity or to harmful leniency. To the superintendent busied and interested in the daily solution of the ever-changing problems of the hour, the rude shocks to which he is ever liable by the errors or omissions of his men, leading to accidents or disasters, are trials of temper, and so disturbing in their effects upon the nervous system as to quite unfit him oftentimes for the exercise of the functions of judge. When contemplating the results of the violation of established laws, which violations often defeat all the provisions which wise foresight had taken for security of life and property, a person of the most equable temper is apt to lose self control and to resort to measures which would be unjustifiable under the most aggravated instances of disobedience.

The recklessness of the grossest offenders is sometimes punished by the courts of the country, but for the multitude of criminals who transgress railway laws, either by commission or omission, the management must provide a code of punitive measures which at its discretion must be applied in every case. The difficulty of administering such laws is enhanced by the vigilance exercised over the rights of its members by the various labor organizations. For real or fancied wrongs perpetrated by railroad managers on such members, strikes may be inaugurated having the widest extension and the most disastrous effect on railway properties. A rash act or inconsiderate treatment of an employe, no matter what may be his standing in the service, may raise a storm the effects of which may paralyze traffic for months and ruin the fairest business outlook. On the other hand, unless these hosts of railway employes are held with a firm hand no one can foresee the disasters to which the service is liable. A corporation in vigorous life and successful financial condition may be made bankrupt by a single act of carelessness. This is no fancy sketch or exaggerated picture of the possibilities of railway life and management.

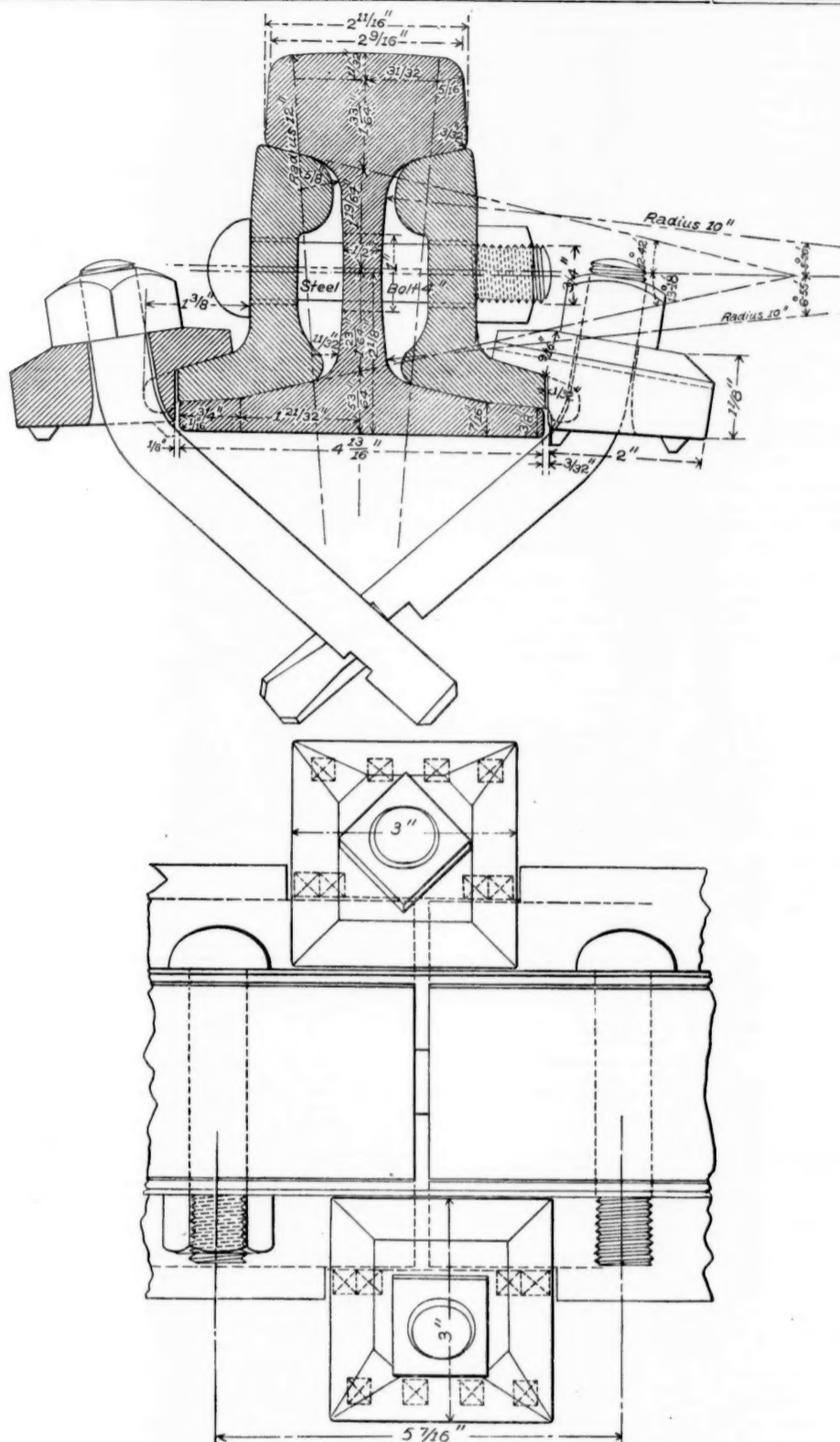
Improvements in physical structures should, and do, elicit eager interest, and commend themselves rapidly to judicious minds; but the ethics of railway management, the maturing and systematizing of a code of laws for classification and punishment of offenders, so aimed and adjusted as to correct the errors and mistakes of employes without unnecessary friction, is a subject of equal if not paramount interest and importance.

The theory on which is based the code of discipline presented below is to clearly state the regulations, which are to be enforced by a penalty, and the nature and extent of the penalty; also to place such regulations before those expected to obey them; to follow up every violation promptly, inflicting a penalty for the violation and not for the consequences of the violation, but only after a fair hearing of the case; and to surround the train rules with greater sanctity than others by treating their violation with greater severity. Further, by increment in the measure of punishment growing with the repetition of offenses, to draw attention to the fact that the offender is gradually but surely working out his dismissal from the service without any agency outside of himself. With the object of drawing attention to this vital factor in railway management, the rules of discipline in operation on the system with which the writer is familiar, are given, in the hope of eliciting debate and inviting criticisms for mutual improvement.

General Rule 35. All rules and orders to employes, for violation or neglect of which penalties are to be inflicted, will be found, first, in book of general rules; second, in book of train rules; third, in the current time-table; fourth, in the current series of orders from the General Manager or Superintendent.

* Report Chief of Engineers for 1888, Part II.

† Report Chief of Engineers, 1888.



OMAHA DEMURRAGE BUREAU.

From statement of G. A. Jones, Demurrage Commissioner, showing the daily average number of loaded cars in U. P. Ry., B. & M. R. Ry., and Mo. Pac. Ry., Omaha yards, for fifteen (15) months following the opening of the Demurrage Bureau, as compared with the corresponding months for the year previous to the opening of the Bureau.

	1886.			1887.											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Daily average cars in U. P. Ry. Omaha yards.	1384	1420	1380	1276	1084	1236	1298	1306	1240	1369	1298	1184	620	523	456
" " B. & M. Ry. " "	844	885	933	583	437	503	540	576	536	607	654	537	303	182	167
" " Mo. P. Ry. " "	284	303	246	206	201	209	196	203	276	291	251	205	143	123	113
Daily average cars in U. P., B. & Mo., R. and Mo. P. Rys. Omaha yards.	2312	2408	2299	2075	1722	1948	2034	2085	2052	2267	2213	1926	1066	828	736
	1887.			1888.											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Daily average cars in U. P. Ry. Omaha yards.	620	523	456	350	359	472	840	704	631	603	650	710	607	488	426
" " B. & M. Ry. " "	303	182	167	140	130	120	310	300	296	320	303	312	293	176	132
" " Mo. P. Ry. " "	143	123	113	62	52	76	109	118	129	133	149	160	146	93	74
Daily average cars in U. P., B. & Mo. R. and Mo. P. Rys. Omaha yards.	1066	828	736	552	541	668	1259	1122	1056	1056	1102	1182	1046	757	632
Per cent. of decrease of cars in Omaha yards.	1246	1580	1533	1523	1181	1276	765	963	906	1211	1111	744	29	71	84
Per cent. of	53.89	65.61	67.84	73.89	68.58	65.50	37.61	46.13	48.53	53.41	50.20	38.62	1.87	8.57	11.41

The daily average decrease for the fifteen (15) months amounts to 955 cars per day, or 436,435 cars for the 457 days since the Bureau was opened. Under the workings of this Bureau these associated railroads have been enabled to dispense with the services of six switching engines and crews.

cars be fixed at $\frac{1}{2}$ cent per mile and 10 cents per day; four-wheel cars one-half of these amounts, and that a general agreement be made to retain these rates for a period of one year, in order that a test of its working may be made at all seasons.

Resolved, That these rates shall take effect upon the respective roads on January 1, 1890.

Owing to the close relations between any plan which involves the payment of per diem rates and the question of demurrage, your Committee present information in regard to the workings of the Car Service Association at Chicago and the Omaha Demurrage Bureau, these organizations having a more extended scope than any other similar organizations in the country.

These statistics are herewith submitted:

Chicago Car Service Association.

[From Report of E. D. Moore, Manager, dated April 3, 1889.]

The above-named association has been in operation sufficiently long to enable members to judge clearly as to its benefits. The main object in starting it was to enforce prompt loading and unloading of cars by consignors and consignees. The exhibits are for the quarter ending with February, 1889. The results for November, 1888, are omitted because the major portion of that month was passed in getting the association into complete working order.

Exhibit A.

Number of track cars reported, also total and average detention of the same during the three months ending February 28, 1889.

ROADS.	December, 1888.			January, 1889.			February, 1889.		
	Cars reported.	Total days detention.	Average daily detention.	Cars reported.	Total days detention.	Average daily detention.	Cars reported.	Total days detention.	Average daily detention.
B. & O. R. R.	1,949	7,423 31	1,353	4,618 3.43	1,050	2,765 2.63			
Chic. & Al.	1,448	3,332 2.30	1,184	2,236 1.90	1,542	2,344 1.52			
Chic. & Atl.	1,397	3,919 2.80	1,041	2,539 2.44	665	1,138 1.71			
Ch. B. & Q.	7,079	14,619 2.06	5,233	9,058 1.73	7,417	13,338 1.80			
C. & E. Ill.	4,614	14,894 3.22	3,851	12,128 3.15	4,294	10,826 2.52			
C. & G. T.	746	2,190 2.93	437	973 2.12	396	688 1.73			
C. & N. W.	5,144	9,954 1.93	7,480	15,424 2.06	6,862	11,843 1.72			
C. M. & St. P.	5,996	11,378 1.90	3,993	8,811 2.20	4,739	7,677 1.62			
C. R. I. & P.	3,816	8,658 2.27	2,921	5,542 1.90	2,937	5,092 1.73			
C. St. L. & P.	1,933	6,004 3.07	1,890	7,848 4.15	1,699	4,698 2.76			
Ch. & W. I.	1,370	3,928 2.87	2,749	7,458 2.71	2,115	6,469 3.06			
C. S. Fe. & C.	675	1,605 2.37	542	1,062 1.96	772	1,223 1.58			
C. St. P. & C.	436	995 2.28	283	550 1.94	457	707 1.55			
Ill. Cent.	3,585	5,855 1.63	2,476	4,119 1.78	3,146	5,756 1.83			
L. N. A. & C.	1,007	2,710 2.69	870	2,189 2.51	837	1,690 2.02			
L. S. & M. S.	2,016	5,465 2.71	1,661	4,478 2.69	1,321	2,865 2.17			
Mich. Cent.	3,242	9,024 2.80	2,062	3,500 1.69	1,055	1,708 1.62			
N. Y. C. & C.	1,093	1,271 1.16	317	479 1.51	787	1,086 1.38			
P. Ft. W. & C.	2,213	7,733 3.40	3,533	6,739 1.91	2,668	5,322 1.99			
Wabash.	2,798	7,494 2.68	1,356	2,933 2.16	1,327	2,933 2.21			
Wis. Cent.	471	1,568 3.33	431	1,432 3.32	424	1,062 2.50			
R. Ass. U. S. Y.	14,962	33,455 2.23	10,029	17,801 1.77	8,804	16,263 1.84			
Total.	60,010	163,474 2.37	55,712	122,247 2.19	55,314	107,497 1.94			

Exhibit B makes a comparison with the corresponding quarter during the previous year, and does this with five roads only, because accurate information as to the average detention of cars was not obtainable from other roads during December, 1887, and January and February, 1888. It is fair to presume, however, that the average detention shown by the lines named was not in excess of that experienced by other roads.

Attention is specially called to the figures which describe the average detention of cars for the two months preceding the adoption of the car service agreement, namely, September and October, 1888. These show that a marked improvement in the handling of cars began as soon as the new rules became effective. For example, the Chicago & Alton, Chicago & Grand Trunk, and Chicago, Santa Fe, & California formerly averaged six, seven and eight days before recovering the use of their cars, while the Chicago & Eastern Illinois actually averaged 12, 14 and even 15 days' detention, whereas neither of the roads has, since the rules of this association became fairly operative, averaged as high as three days' detention, a saving which would have seemed almost incredible had it been predicted one year ago. Financial results show that the car service collections have gradually decreased, which further indicates that cars are now handled more promptly by shippers and receivers.

In addition to the benefits shown in these statements there has been a noticeable decrease in the expenses of operating yards within the limits of the association, the saving being principally in the switching department. It is gratifying to

note that the opposition encountered since the adoption of the agreement is rapidly disappearing. In fact, there is now but little friction between the roads and their patrons so far as the requirements of this association are concerned.

Exhibit B.

Statement showing the average daily detention of track cars on the Illinois Central, Chicago & Eastern Illinois, Chicago & Alton, Chicago & Grand Trunk and Chicago, Santa Fe & California for December, 1888, and January, and February, 1889, as compared with the corresponding months of preceding year.

ILLINOIS CENTRAL.		CHICAGO & EASTERN ILLINOIS.		CHICAGO & ALTON.		CHICAGO & GRAND TRUNK.		CHICAGO, SANTA FE & CALIFORNIA.	
December, 1887.	Average, 4.60 days.	December, 1887.	Average, 12.20 days.	December, 1887.	Average, 8.00 days.	December, 1887.	Average, 4.98 days.	December, 1887.	Average, 10.18 days.
1888.	1.63	1888.	3.22	1888.	2.30	1888.	2.93	1888.	2.37
1889.	4.80	1889.	10.60	1889.	6.50	1889.	5.25	1889.	8.64
1889.	1.78	1889.	3.15	1889.	1.90	1889.	1.95	1889.	1.95
1889.	4.40	1889.	12.40	1889.	1.52	1889.	4.91	1889.	8.17
1889.	1.53	1889.	2.52	1889.	6.00	1889.	1.73	1889.	1.58
1889.	3.60	1889.	15.50	1889.	4.75	1889.	6.36	1889.	9.29
1889.	3.70	1889.	14.10	1889.	3.16	1889.	6.25	1889.	9.49
Decrease, 2.97 days.		Decrease, 8.98 days.		Decrease, 5.70 days.		Decrease, 1.45 days.		Decrease, 7.81 days.	
January, 1888.	1.63	January, 1888.	10.60	January, 1888.	6.50	January, 1888.	5.25	January, 1888.	8.64
1889.	4.80	1889.	3.15	1889.	1.90	1889.	1.95	1889.	1.95
1889.	1.78	1889.	12.40	1889.	1.52	1889.	4.91	1889.	8.17
1889.	4.40	1889.	2.52	1889.	6.00	1889.	1.73	1889.	1.58
1889.	1.53	1889.	15.50	1889.	4.75	1889.	6.36	1889.	9.29
1889.	3.60	1889.	14.10	1889.	3.16	1889.	6.25	1889.	9.49
Decrease, 2.97 days.		Decrease, 8.98 days.		Decrease, 5.70 days.		Decrease, 1.45 days.		Decrease, 7.81 days.	
February, 1888.	1.63	February, 1888.	10.60	February, 1888.	6.50	February, 1888.	5.25	February, 1888.	8.64
1889.	4.80	1889.	3.15	1889.	1.90	1889.	1.95	1889.	1.95
1889.	1.78	1889.	12.40	1889.	1.52	1889.	4.91	1889.	8.17
1889.	4.40	1889.	2.52	1889.	6.00	1889.	1.73	1889.	1.58
1889.	1.53	1889.	15.50	1889.	4.75	1889.	6.36	1889.	9.29
1889.	3.60	1889.	14.10	1889.	3.16	1889.	6.25	1889.	9.49
Decrease, 2.97 days.		Decrease, 8.98 days.		Decrease, 5.70 days.		Decrease, 1.45 days.		Decrease, 7.81 days.	

Exhibit A shows a steady decrease in the average daily detention of cars on all roads except two since the adoption of the new rules. The general average was as follows:

During December	2.37 days per car.
January	2.19 " "
February	1.94 " "

Statistics obtained from the New York & New England, the only railroad in New England which is uniformly enforcing demurrage, and whose larger stations are all competitive points, show that the increase of mileage of their own cars, on their own line, for eleven months after the demurrage rule took effect, was 75 per cent. over that for the same number of months previous to that time. The increased mileage of New York & New England cars on their own and foreign roads, was 25 per cent. The average number of cars standing under load at the principal stations was decreased 65 per cent.

The working as above shown clearly demonstrates the practicability of collecting demurrage under proper organization. Of the desirability of doing so there can be no question, and your Committee would therefore recommend that, commencing with Oct. 1, 1889 [changed by the meeting to Nov. 1], demurrage shall be charged on all roads at the rate fixed upon by this Convention at its meeting in October, 1888, and that bureaus similar to those above mentioned shall be organized at all railroad centres, in order to enable competitive roads to carry out this recommendation.

Freight Car Trucks.

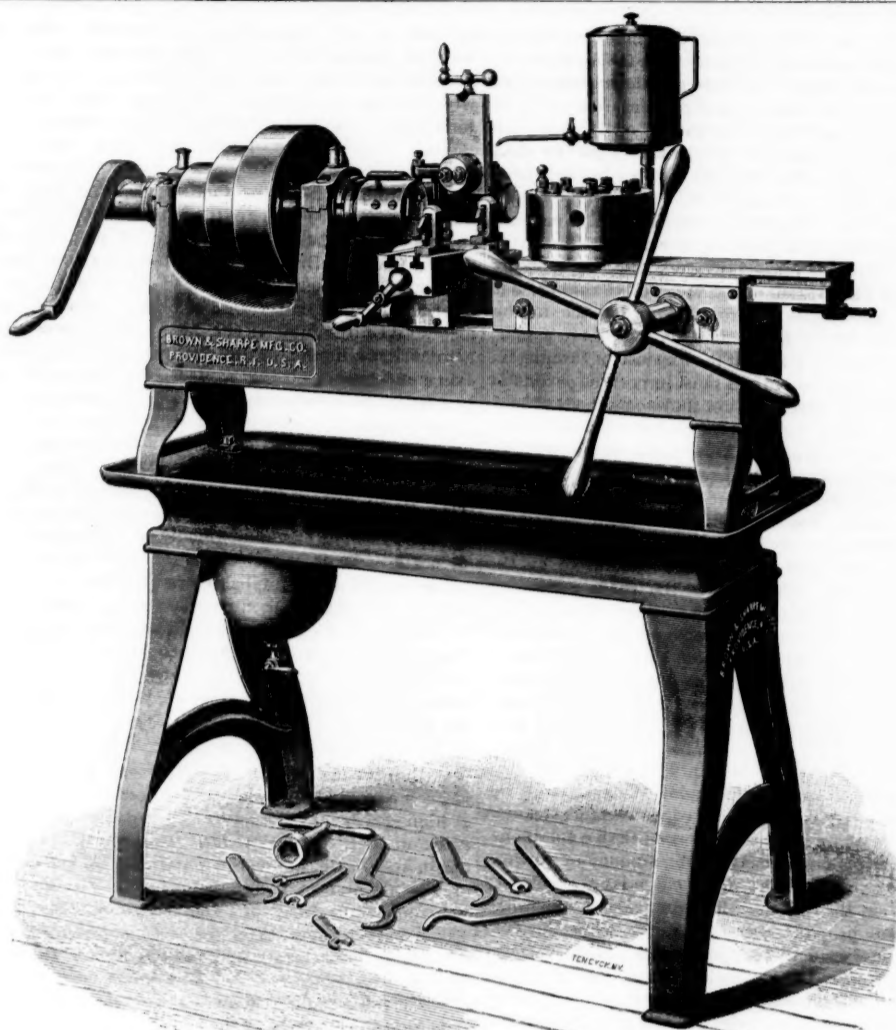
At the regular meeting of the Northwest Railroad Club, April 5, the subject of freight car trucks was discussed. It was opened by a paper by Mr. J. C. Barber, read by the Secretary. An abstract follows:

Mr. J. C. BARBER (Northern Pacific): The popular freight car truck of 30 years ago was generally known as the "diamond" or "double bolster rigid truck," with vertical motion, but entirely without lateral motion. As they were only intended to carry 10 and 12 tons, it was not found necessary to fit them with axles having journals larger than 3 in. x 5 in. or with journal bearings having an average weight of more than 6 lbs. The arch-bars or truck frames were of $\frac{1}{2}$ in. x 8 in. iron, secured in position with column and oil

box bolts made of $\frac{1}{2}$ in. iron. The oak bolsters, as a rule, were not trussed and readily sprung down at centres, throwing the weight of car body almost entirely on the side bearing. The popularity of these trucks continued up to the time a demand was made for cars which would carry 20 tons, or twice the capacity of the old style; we then soon found that the old rigid trucks could not be made to give satisfaction under cars of twenty tons capacity. It was also discovered, in carrying 20 tons and over on the old "rigid" trucks, that, for want of lateral motion, the wheel flanges were thrust against the rails by the continual lurching of the car body, and were rapidly worn out, as also were the collars on journals, the ends of brass bearings and many other parts. To obviate this difficulty the swing motion truck was introduced and quite generally adopted throughout the country, as it was, and is now, regarded as a remedy for the defects above mentioned; but there are objections to the swing beam truck and a number of roads decline to use them on account of the increase in cost as compared with the plain double bolster or rigid truck and the large increase in the number of parts, many of which require frequent renewing; also on account of the additional expense of maintenance in the way of inspection and repairs. While these imperfections are generally admitted, the friends of the swing-beam truck have always claimed that the saving in wheel wear alone would fully compensate for the additional cost. It seems evident, taking into consideration the number of roads now using the swing-beam truck, that it has been the most popular truck, so far introduced, for carrying a load of 20 tons, but now that there is a general tendency and demand for cars and trucks having a capacity of 25 and 30 tons, it seems to be a doubtful question whether a truck of the swing-beam pattern is safe and practical for such cars on account of the numerous truck hangers, pivots and pivot seats, su-pended spring planks, friction plates, pins, keys, washers, etc., all of which are continually getting out of order, or in other words are very treacherous and no doubt have been the cause of a large per cent. of derailments and wrecks. It is a noticeable fact that many of the largest lines in the country who have recently been building 25 and 30 ton cars are using the old style rigid truck, with all parts enlarged and otherwise strengthened, as they claim it to be more practical and preferable to the swing beam truck, which has numerous parts that cut out and break down under cars of 25 or 30 tons capacity. All roads are experiencing more or less annoyance on account of broken down tender and freight car trucks and I think we can safely say that seven out of every ten cars received in our repair shops and yards for running repairs are sent in on account of defective trucks. There are various reasons assigned for these defects and breakages, among the most prominent are—faulty construction, poor material, capacity over-rated and overloaded, trucks with so many parts that it is impossible to allow inspectors time to examine all trucks built at car factories of green lumber that warp, shrink and fall in pieces before they have seen a year's service. However, from the fact that these defects and breakages do not occur from the causes mentioned, it is time the mechanical departments of railroads awake to the fact that a truck should be produced and adopted which will safely carry a load of 30 tons and have a reserve of 10 tons, and when this is done our freight departments will soon save enough in claims for damaged freight caused by broken down trucks to compensate for the difference there may be in the first cost of trucks, and also avoid numerous delays and annoyances.

Mr. MATHEWS (Ohio Falls Co.): With regard to these 30-ton cars, it occurred to me as a builder of cars, and traveling all over the country from Maine to the Gulf, that a car of 20 tons capacity, or 25 at the outside, should be the limit. The axle adopted now, $4\frac{1}{2}$ in. at the centre, and a $3\frac{1}{2}$ by 7 in. journal, is ample, in my judgment, for any load that ought to be carried in a car. Whenever you increase the length of a car and attempt to increase its capacity you simply add enough material to compensate for the difference; you gain nothing at all. It should be the object, I presume, to so construct the truck and so construct the car as to lighten it and yet carry a heavier load; that is, to carry less dead weight in proportion to your load. If you look over the statistics of freight cars you will find that there has been very little advantage gained over the old 10 or 12-ton car, of 28 ft., I think. You have done very little beyond carrying the dead weight that you did on the 10-ton car. In order to compensate for that difference you have had to increase the weight of your rails, the number of your cross-ties, the strength of your bridges and the size of your locomotives to carry these extra sized cars, so that the dead weight you carry and the revenue weight are just about the same in proportion as they were with the old style car and engine. Then cars used to last from 12 to 18 years; and I doubt if the life of any car now is eight years. The cost for repairs more than keeps pace with the increased weight. The axles wear out faster, the wheels wear out faster; the same with the boxes, brake shoes and drawheads; they are heavier and more expensive; so with the links and pins, and all these taken into consideration go far beyond anything that you have gained in making the 34 ft. car weighing from 26,000 to 34,000 lbs. in the place of the old 28 ft. car weighing from 18,000 to 20,000 lbs. We are building some cars for the Pennsylvania road that will weigh 33,000 lbs., that carry no more than some of your cars that do not weigh over 24,000. They make no more revenue and the mileage is $\frac{1}{4}$ of a cent, whether the car weighs 24,000 or 34,000 lbs.

I think the axle is now as large as it ought to be, and it



SCREW MACHINE.

Made by the BROWN & SHARPE MANUFACTURING CO., Providence, R. I.

is larger than there is any necessity for. The wheel we are now adopting of 600 lbs. is too heavy for your 25-ton car by 40 lbs. A 560-lb. wheel will last just as long and do as good service as a 600-lb. one. You are drawing 320 lbs. more a car than is necessary. An axle weighing 365 lbs. dressed is just as good, and will last just as long as one weighing 420 lbs., because the wear is on the journal where you have not increased it any; and it seems to me there is no particular necessity for increasing it in the centre. I believe that the bodies of freight cars are entirely too heavy, and made too heavy throughout. This tendency has been, of course, brought about, not by the mechanics—in need, somewhat against their protest—but by the operating department, who wanted to get a big car and a big car-load to beat its opponents.

Mr. PATTEE: I am glad to see this subject come up. In my opinion it is one that has been overlooked for a good many years past. It was but a few years ago that a freight car was made out of culled timber. It was made of scrap iron and culled material generally; anything was good enough for a freight car truck, and the man who couldn't do anything else was put to making a freight car truck. It was a fact that it was only one step from the scrap heap, and that step in a good many cases was a short one. Now, as the load is getting to be from 25 to 40 tons on every car, it appears to me we are not increasing the different parts as much as the load requires. I would have the axle fully as large as the Master Car-Builders' standard. I would put in boxes at least $9\frac{1}{2} \times 10$ in. if I could get them, good width, with good chances for packing. For heavy cars I would use a journal from $3\frac{3}{4}$ to 4 in. by 7 or $7\frac{1}{2}$ in. My reason for that being the longer the journal the greater the liability to break in proportion to its size, at the inside end. We break off a good many journals $3\frac{3}{4}$ by 7 in. long, and always break them at the inside end; that is, next the wheel, inside the wheel, particularly with the soft metal brases.

Mr. BARBER exhibited and explained a model of an improved truck, and said: We have never been able to get the lateral motion to relieve the wheel flanges, except through the medium of hangers. It takes four of these hangers, or eight to a car, and that in a thousand cars amounts to 8,000 hangers to look after, with all of their separate fittings. It has been in my mind, and probably in yours, that if you get over 40,000 lbs. on a hanger it is not a very safe thing to have there. At least, a large number of the trunk lines have thrown it out entirely: the Pennsylvania, the Michigan Central, the Gould Southwest system, and a large number of roads, the Wabash and others have done so, that is, for 25 and 30-ton cars. I get the lateral motion by putting in a steel roller of $2\frac{1}{2}$ in. in diameter and about 9 in. long, resting in the top of the spring cap, which has a curved recess. When the car gives a lurch the roller has to roll up this recess, roll up the curve, which makes a resistance to the play on the wheel flanges or on the brases. The roller will always find the lowest part of that curved recess, and the lowest part of that curve is at the centre, and when in that position the bearings, the arches, the truck frames, etc., are the same. In other words, the car comes back to the centre of the track without any help, and it will always ride in the centre of the track. That curved recess is only $\frac{1}{8}$ of an inch deep, and I might say I have tried it down as low as $1\frac{1}{2}$ in. I found at $1\frac{1}{2}$ in. it was impossible to move this; I took as high as 20 men at one end of the car, and I don't think we could move it $\frac{1}{8}$ of an inch. Then I tried it at 1 in. and I found that too much, and at five-eighths deep it takes about 3,000 lbs. of a pull to move that over enough to make these foot-pieces strike the arch end.

The spring in this truck is placed directly over the centre of the arch bar, and it becomes equalized when the wheels drop into a sag; it allows the spring to work free, gives it free motion, and does not bind it to the swing beam. Most of the springs are attached to the swing beam, and if your beam rocks backward and forward it carries the spring with it, and that has a tendency to break the coil. In this case the spring remains stationary, and the beam works back and forward freely.

Mr. REED: I think if you had a good strong hanger at each end, such as would answer the purpose, and place them at an angle and dispense with the rollers, it would be better. I think a good many would look at the roller as being somewhat detrimental as being likely to flatten. I think if you put in a good substantial hanger and dispenses with that roller that you would have the truck.

Mr. BARBER: I would like to have you see them, and you would see they don't flatten. My reason for thinking that these rollers will not flatten is on account of the spring making a kind of a cushion, and the weight of the car is on the rollers all the time, and if the car jumps up the spring follows it. Suppose the roller does flatten, though I have never seen one flatten yet, would it be any more expensive to renew a roller than it would to renew a hanger? I have had one of those cars loaded with $34\frac{1}{2}$ tons, and have run it 60 miles an hour round the sharpest curve we had. I have one car in service between Brainerd and Duluth that is carrying 25 tons of coal, and that has been in service for several months. I examined the rollers the other day, and they are about as perfect now as they were when they were put in. They were made of common round bar iron. We specify steel for our rollers, but these are simply round bars of iron sheared off and finished up a little. The roller seats are common cast iron. We had no trouble with it, it has cost nothing for repairs.

Mr. REED: What would it take to convert the diamond truck, that is similar to that used by the Kansas City and Manitoba roads, to a truck like yours. Supposing it to be the same class of truck, what would it cost to convert it to your pattern?

Mr. BARBER: I don't think it could be converted at all. You have a solid end casting, and these spring caps are guided in slotted grooves on the sides. It would be impossible to turn an ordinary swingbeam truck into a truck of this kind. You could use the arch bars and the truck transoms.

Mr. PATTEE: Mr. Barber says many trunk lines have dropped the swing beam and come down to the rigid truck. I would like to hear a little upon the qualities of the two trucks, one as compared with the other.

Mr. BARBER: As I understand it, the roads that have adopted the 25 and 30-ton car claim that the hangers and pivots are not strong enough. There are too many parts to be looked after on the hanger; that these hangers have to rest on round pivots of probably $1\frac{1}{2}$ or 2 in. in diameter; that they go through the top to the bottom, and at the bottom they rest on pivots that support the spring plank, and they are about the same size as the top pivots. There is another point, that a swing-beam truck is usually supported for 12 to 15 or 16 in. on a truck transom away from the arch which has to carry the load. And then this transom crushes down unless it is trussed, or if iron channel bars are used they have to use them of extra weight. If you look over any of our channel bar trucks that were built three or four years ago, you will find that the flanges directly under the trunnions that carry these hangers are sprung down, or bent over. This is the principal reason, as I understand it, that the Pennsylvania and a number of other roads have decided that they are

unprofitable to use. The ordinary swingbeam truck usually has a mortise through the centre. It seems that this greatly weakens timber, and that is another great objection to it. On the rigid truck they have a bearing directly under the centre of the arch bar if the truck is properly constructed. Mr. Mathews says not mortise the truck timbers in any event, but they have to put trunnions clear across, and then the trunnions spring down and the hangers work up against the spring bar and chafe. There is another point, the swingbeam truck takes eight friction plates to each truck, or sixteen to the car, and with heavy loads the lurching back and forth continually breaks loose these friction plates.

Mr. REED: I think the axle is one of the main features of the freight car truck. While we all know they are increasing the load in cars I think we should make some provision as far as we are able to enlarge the bearings. Increase the diameter from $3\frac{3}{4}$ in., as it is now, to $4\frac{1}{4}$ in., or, say $4\frac{1}{2}$, and then arrange it so that the bearing shall be precisely as it is at present, 7 in. I think that is a matter that requires consideration, and I think it will be quite right that for a 60,000-lb. car it can be increased to $4\frac{1}{2}$ in., and when reduced down to $4\frac{1}{4}$, then transfer it to lighter service.

The PRESIDENT: We have got to put in an axle that will carry the heaviest load according to the capacity of the car, and the question is if it would pay to have a variety of axles on the road for the different weight cars. I think this is a most important point to be decided by railroad men—what length of axle they are going to use—that is, the length between centres. You can increase the diameter, but you have got to keep the distance between centres. If you take an 8 by 4 or 8 by $3\frac{3}{4}$ and put it in a car with a truck that has been used for a $3\frac{3}{4}$ by 7, of course it creates a great deal of side play, and it will not work right. On the other hand, if you keep the same distance between centres you can use that axle in a lighter service after it is worn. Take it the same way with passenger equipment. On the road I am with I find a large percentage of axles broken $3\frac{3}{4}$ by $8\frac{1}{2}$; by that I don't mean those that are broken by being heated and then cooled, or anything of that kind, but those that are broken when the journal is cold. They are invariably broken at the inside end of the journal. I find the fillet perfect. I presume we have 15 or 20 all broken in the same place. It is principally what is known as an $8\frac{1}{2}$, when the journal is turned $8\frac{1}{2}$ to take an 8 in. brass. That is, it is finished $8\frac{1}{2}$ in. In tracing that up last year I found the crank pin on a mogul engine broken in the same way. That was an $8\frac{1}{2}$ journal too.

Mr. MATHEWS: Don't you find that frequently when the fillet is worn away?

The PRESIDENT: No, sir. I found them broken with the fillet perfect.

Mr. REED: I have never seen one broken with the fillet perfect. Was that pin iron or steel?

The PRESIDENT: A steel pin.

Mr. HILL: I should not recommend anything more than 7 in.; 7 by 4 I think is about right.

The PRESIDENT: $4\frac{1}{2}$ by 7 would be better.

Mr. HILL: I don't know whether it would or not; I would be willing to trust a 4 by 7; it stands usage pretty well. You will notice it is the $8\frac{1}{2}$ -in. axles that are breaking.

Mr. McCORMICK: I think on the subject of the size of the axle, Mr. Hill's ideas are very good, they would be my own, —a 4 by 7 journal for the 40,000-lb. capacity car—I think, and my experience would be that a full sized $3\frac{3}{4}$ or $3\frac{1}{2}$ journal would be amply sufficient under ordinary circumstances. And if the truck is otherwise substantially built, with no defects in it where it could give out, I don't think the axle would give out there. I have cut them down to $3\frac{3}{4}$ or $3\frac{1}{2}$ with good success. I have found a good many that have been broken at the inside of the journal, but the fillet was generally cut out. I don't know that I have ever seen one that was broken when that fillet was not cut out more or less.

Mr. PATTEE: In your broken axles do they appear to have broken off at one blow, or do they appear to have broken in a straight line, and by degrees?

The PRESIDENT: By degrees, that is, the majority of axles we have found broken. Not when they were burnt off. I don't know that I ever found one $3\frac{3}{4}$ by 6 in., but I know of a dozen of these $3\frac{3}{4}$ by 8 in. that have broken; and the journal was always up to size, not varying more than $\frac{1}{8}$ or $\frac{1}{16}$ of an inch.

Mr. REED: That showed that the breakage of the journal was something in proportion to its length. We have got some cars of 60,000 lbs. capacity with 4 by 8 in. journals that are giving very good satisfaction, as far as I know, and I don't know that we have had any breakages of journals.

Brown & Sharpe Screw Machine.

The machine shown in our illustration is designed for a variety of small work in the machine shop, such as making screws and studs and many small parts. Ten tools can be used while the work is held in one position. The cost of the work is thus reduced and accuracy and uniformity are gained.

The spindle boxes, $2\frac{1}{4}$ in. and $2\frac{1}{2}$ in. in diameter, and $3\frac{1}{2}$ in. and $2\frac{1}{2}$ in. long, are steel, hardened and ground inside and out. The spindle is also steel; its front bearing is hardened, and both bearings are ground. The spindle cone has three grades, 6 in., $8\frac{1}{2}$ in. and 11 in. diameter, for 3 in. belt. Size of hole through spindle, $1\frac{1}{2}$ in.; number of holes in revolving head, 7; diameter of holes in revolving head, $1\frac{1}{2}$ in.; movement of revolving head slide, 9 in.; length that can be milled, 6 in.; swing over slide rest, $6\frac{1}{4}$ in.; swing over bed, $13\frac{3}{4}$ in.; length of bed, 50 in.

The countershaft has friction pulleys 14 in. diameter, $3\frac{1}{2}$ in. face, and should run 190 turns per minute.

The weight ready for shipment is 1,450 lbs. The floor space, measured over extreme projections, 32 by 62 in.

Kirwan's Station Indicator.

An instrument for conspicuously showing in passenger cars the name of the station at which the train will next stop, which is the invention of Dr. G. H. Kirwan, of Wilkes-Barre, Pa., has been in use experimentally on a local train of the Lehigh Valley road recently for several weeks. The apparatus in each car consists of a roller carrying a wide ribbon or scroll on which the names of the various stations are inscribed. It is inclosed in a neat case with a glass front, and the instruments in the several cars are connected electrically with the baggage car, where, by means of a button, the baggagemaster or other trainman immediately after leaving each station sets in operation the mechanism which moves the ribbon and causes a new name to appear. We understand that the indicator has worked with perfect satisfaction during the whole of the trial.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Superintendents' Association, whose spring meeting we report in another column, has done better than ever before. Although it would not have been difficult to keep up discussion longer, the business was finished up in one day, thus avoiding any danger of the dullness which is liable to follow long drawn out deliberations. The proceedings were of somewhat informal character, as heretofore. The address of the President, Major Gadsden, was an important feature of the meeting, and all apparently agree with him as to the objects and destiny of the Association. The number of new members is encouraging, and the financial prospects are hopeful, so that a moderate amount of hard work in arousing interest ought to easily prove that there is a field for the Association. Secretary Hammond's circular of inquiry concerning steam heating elicited considerable information, and the report on this subject was the most practical feature of the meeting. The questions in the circular were very numerous, and subdivided and classified to an unusual length, and a request was made that the answers should be brief. It is quite possible that more valuable information would have been obtained had fewer questions been asked and more detailed replies requested, particularly as the discussion of the subject in the convention was not very full, but in view of the large proportion of unsatisfactory replies to all circulars Mr. Hammond can feel considerable satisfaction in his plan.

The answers to the 60 questions of the Superintendents' circular on steam heating are summarized on another page. They tell little that was not known before, except the precise statements of the details of equipment of the twenty roads reporting. Unfortunately there is no report from any road using a return system, none from some of the roads that have the largest experience, and none from the roads in the Northwest, where the problem is so much complicated by intense and long-continued cold. The answers that are given are very brief, and in certain important features they are very few. For instance, one of the most interesting things to be determined now is the relative economy of heating from the locomotive and from independent heaters. On the demonstration that continuous heating is cheaper its speedy adoption depends, more than upon any other influence. Bearing on this there were in the circular two questions (15) asking the quantity of water condensed per car per hour, and (16) asking if the consumption of coal by the locomotive is materially increased. To question 15 only four roads reply, and the answers are so deficient in detail as to be of value only as corroborating other observations. In answer to question 16 four replies state that the fuel consumption of locomotives is "perceptibly" or "slightly" increased, but give no figures. The other 16 simply say no. So far as can be ascertained from the report the water evaporated by the Sewall and the Martin systems is from 57 to 65 lbs. per car per hour

with an external temperature of 23 degrees Fahrenheit or less. This agrees very closely with the estimates of Mr. Soule and others, who have put the amount at 60 lbs. Prof. Lanza's tests gave a condensation of 77 to 92 lbs. with an external temperature of 19 degrees to 30 degrees. Taking the condensation at 60 lbs., we may assume that the coal burned on the locomotive to heat a 7-car train will be 70 lbs. per hour. This is so small a part of the total consumption of fuel that it is quite apparent that this extra amount of coal burned in each trip could easily escape the observation of the locomotive runner; but it would make quite a perceptible difference in the fuel account of the locomotive department in a year. Nothing whatever is said of the expense of running individual heaters, and in this most important particular of the comparative economy of the two methods of heating we are left as much in the dark as we were before. That the members of the Association agree with all others who have carefully investigated the subject, as to the marked economy of continuous heating, is plainly evident; but what is most wanted at present is some definite knowledge concerning the amount of saving. The report is even less conclusive on the question of traps. Thirteen of the roads answering the circular use traps and make little or no note of any difficulty with them. Three use them, but think they would be better off without them. Three do not use them. So far, therefore, as it goes, the testimony is rather against than in favor of traps—the testimony for them being negative and that against being positive.

An erroneous statement is going the rounds of the press that a large cylinder will condense more steam in proportion to the total amount used than a small one, for the reason that it has a larger amount of surface. To show the falsity of this statement, it is only necessary to point out the fact that the steam used in a cylinder is nearly in proportion to its volume, while the condensing surface depends upon the area of the surfaces of the cylinder. The volume of a cylinder, when the length is constant, varies as the square of the diameter, while the surface varies directly as the diameter. From this it is easily seen that the proportion of the area or condensing surface to the volume of steam used is less as a cylinder is made larger, and, therefore, less condensation of steam is to be expected, as a result of the cooling effect of the walls of the cylinder, from large than from small cylinders, in proportion to the steam used.

A note in another column states that the Chicago, Burlington & Quincy has started a scientific firing school, in a car, to travel from point to point on the line and instruct the firemen in the proper performance of their duties. This is an office which has been in the past on the C. & Q. road, and is at present on most other roads, performed by the traveling engineer. During the past year increased economy in the use of fuel has been constantly demanded from the operating departments of the large roads, and most explicit directions have been issued to the engineers and firemen regarding handling fires to prevent smoke and cinders. The traveling engineer has been spurred up to watch more carefully and instruct with greater earnestness the delinquent who puts in all his coal when the engine is starting a train or who slips the drivers and tears the fire into fragments which scatter themselves over the road bed. But in spite of all this effort to compel the traveling engineer to fulfill what are the real duties of a traveling fireman, there has been little reduction of the volume of steam and smoke continually pouring out of the safety valves and stacks of locomotives at stations and at other points on the line where the work is so light as to preclude the necessity for such an evil. The reason for the failure of the traveling engineer to meet the demand for more careful and specific instruction of firemen is easily seen. It is not because of his incompetency, or from lack of hard work, but simply that the increased duty is far larger than the original scope of his office demanded. While the duties of a traveling engineer, in his dealings with engineers in particular and with firemen in a general way are, according to the generally accepted plan, exacting, yet he has a higher grade of intelligence to deal with on the average than when he attempts more particularly to instruct the firemen in methods of firing which require the utmost care and watchfulness to obtain anything like the desired results. If he attempts to be too fine in his language or instruction he is met with derision, and any innovations have to be carried through by main force, often against the will and opinions of the men who were not taught that way. To overcome the natural objections on the part of the engineers and

firemen to new departures, to determine what is the best method of firing the different types of locomotives under different conditions, to properly instruct the firemen when the best way is determined, to see that such instructions are carried out to the letter, and last but not least, to keep himself posted on the character of the different kinds of fuel which from time to time arrives on the line, are the duties of the traveling engineer under the extension of the old plan. It will thus be seen that the traveling engineer has more than he can attend to satisfactorily when he is called upon to bring about an innovation or even a uniformity in locomotive firing, and as the demand for a more economical consumption of fuel is growing rapidly, and every endeavor is being made in the design of the locomotive to decrease the necessary loss to the lowest possible limit, it is evident that either a traveling fireman must be added to the rolls of railroad employees, or a school of instruction, such as is started by the C. & B. & Q., must be put in general operation. There will be a difference of opinion as to which is the best method to adopt, but undoubtedly each will have its advocates. To us it seems that the traveling fireman would be able to accomplish more by object teaching, with the shovel in hand, in actual service, than could be accomplished with the same or a greater amount of labor expended in a firing school, even if it were equipped with miniature boilers and apparatus, as has been suggested in connection with the Burlington firing school.

Within the last year, on five different occasions, it has come to our knowledge that locomotives running at high speeds have severely injured the rails and track of five different roads. This was the result, not in every case of over counterbalance, but rather of the attempt to counterbalance the inertia in a horizontal direction, of the reciprocating parts. These actual facts take the action of locomotive counterbalances on rails and bridges out of the field of mere speculation. To show what may be the effect of these counterbalances at high speeds, we may state that in two cases of the five just mentioned the rails were bent vertically to such an extent as to render the track impassable at high speeds for over two miles in length, and in one case the wheel rose so far from the track in its upward gyration as to crush the wheel-guard and running-board. We have called attention to the necessity for giving much care to this subject before in these columns, and we wish to again urge all engineers who are interested in this subject, either from choice or because of their responsible connection with railroad corporations, to offer something, either in the way of design or suggestion, which will reduce the evil which already exists in the best designs, and allow locomotives to be driven at the high speeds of the immediate future without endangering the permanent way. We are not offering this as a result of speculation, hypothesis or incomplete theory, but rather as facts which are so obstinate and pertinent that two railroad companies have decided to order the removal of all that portion of the counterbalance in locomotive driving wheels which is intended to counteract the inertia of the reciprocating parts. In order to assist in obtaining information for certain engineers of the highest standing, we propound the following question to our readers, with the hope that they will consider it a personal inquiry, directed particularly to themselves, and, as such, give it their best attention. Is it necessary to add to a locomotive driving wheel counterbalance an additional weight to resist the inertia of the reciprocating parts, and thereby reduce the motions of a locomotive known as nosing, lurching and galloping?

It looks as though the prohibition of reductions in rates without notice would work unfairly against those railroads which are subject to competition of carriers outside of the control of the act. If a railroad and a water route are in competition, the latter can reduce rates without notice. The railroad must wait three days. At the expiration of those three days the water route can make a further reduction, and can constantly keep its rates enough lower than those of the railroad to leave a slight margin in its favor. When matters have been at last reduced to a wholly unremunerative point, it is possible, if water carriage is under the control of one transportation company, to make a sudden increase of rates, and leave the railroad unable to follow suit for ten days to come. During all this time it will be burdened with a volume of business at non-paying rates. Some of our readers will remember how Commodore Vanderbilt, in a war with the Erie, brought cattle rates

down to five dollars a car load, or even lower, and then quickly, through unknown agents, made long contracts for transportation at that rate by the Erie. When the Central restored rates, it had the satisfaction of compelling the Erie to carry at a dead loss for some time afterward. Long contracts are now prohibited by mutual agreement; but a competing water route may apparently use the ten-day clause as a means of subjecting the railroads to a somewhat similar burden.

Many people thought that the Inter-state Commerce law would result in furthering railroad consolidation throughout the country. It has not had precisely this effect; but it has at least caused a development of railroad associations in larger and better organized forms. The prohibition of pooling, instead of doing away with such combinations altogether, only makes the need of their effective working all the more strongly felt. Instead of rendering the machinery of association useless, the present state of things makes greater demands upon it than ever before. The Inter-state Commerce Railway Association and the Central Traffic Association show the most marked results of this tendency. Less extensive, but no less significant, is the organization of the Board of Presidents of the New England roads. It shows that the loose relations between these roads and the trunk lines, which have in times past been maintained simply through the Joint Executive Committee, are now found to be inadequate. The present argument provides for a system of arbitration of disputes; for a report, to Commissioner Fink's office, of the amount of competitive traffic carried, and for a readjustment of differentials in case one road shall unduly gain at the expense of another. The differential is only on lake traffic, and the poorer time made by the water lines will probably in the future, as in the past, mark a pretty definite limit to the amount of traffic which these can take away from the all-rail lines. No definite division of percentage of traffic is contemplated, and the organization is apparently such that Mr. Fink can set forth the facts and a change in rates be made on very short notice.

The best guarantee of the success of the present arrangement is the fact that Mr. Bliss, of the Boston & Albany, is Chairman of the Board of Presidents. The Boston & Albany occupies a commanding position in the competitive New England traffic. The strong roads, like the New York, New Haven & Hartford or the Boston & Maine, are but slightly competitive. The competitive roads, like the New England, the Fitchburg, or the Central Vermont, are only moderately strong. Differentials will have to be allowed by the Boston & Albany to the other lines. As long as that road is willing to allow such differentials as may be awarded, rather than run the risks of rate-cutting, the agreement is likely to stand. The fact that Mr. Bliss is willing to take the lead in the association shows that he is fairly well satisfied; the fact that the other roads are willing to give him the place implies that they are also.

The Recent Performances of the Strong Locomotive.

In our last issue we gave an account of the runs made by the locomotive "A. G. Darwin," on the Erie road, from Jersey City to Buffalo and back. The run was 422 miles each way. Going west it was made in 13 hours, an average of 32.5 miles per hour. The time in motion, however, was 10 h. 9 m., giving a speed of 39.5 miles per hour. This was with a train of between 300 and 400 tons weight, including the engine (the number of cars hauled varied), with some long grades and a slippery rail. The eastward run was made the following day in 11 hours actual running time. This train was also the regular express train, and weighed about 375 tons. These runs are very remarkable in themselves and would be most creditable to any locomotive, and when it is remembered that they were made by an engine of a new type and one quite lately put in service, they reflect great credit upon its designers.

From time to time various patented as well as unpatented locomotives of peculiar design have been offered for trial, and the number of them that have sunk into oblivion after far less trials than those in which the Strong type of locomotive has proved itself worthy of consideration, can best be appreciated by a perusal of the files of the *Railroad Gazette* wherein they were described as produced. Locomotive designers are inclined to their peculiar notions regarding new styles of locomotives, and if all opinions were alike there would be but little progress. Therefore, it must be expected, when a radically new design of any portion of railroad equipment is presented, be it locomotive or anything else, that there will be a wide

difference of opinion regarding it. The Strong locomotive is an innovation, and we may say a radical innovation, and one which will, to a greater or less extent, change or solidify the conviction of many locomotive designers, particularly regarding the possibilities of locomotive design. For years we have gone along with what is essentially the same type of railroad motor. The principles of its construction and its design have become so stereotyped that little or no really original thought is needed to produce the general plan of our American engine, but this cannot always continue, and, in substantiation of it, we call attention to the fact that at the present time we have presented to us two types of locomotives for trial on American railroads, both of which are in many respects new.

One of these locomotives, the Strong, has been designed with reference to the needs of American service, and, so far in actual trial, has given promise of fulfilling those demands to an extent which was scarcely believed when the general characteristics of the locomotive were first made public. The other, the Webb compound, was designed to meet the requirements of English service, and in that service has proved itself to be, so far as economical operation and capacity for high speed are concerned, a success without a doubt. In American service of the severest kind, which means heavy through express trains, she will probably find a class of work with which she is unable to cope—not because there is anything wrong with the principles of her construction, but rather for the reason that she was never intended for such service. Within the limits of her operation, the compound will undoubtedly prove to be a very economical locomotive. Between these locomotives it is not necessary that any choice should be made. Each may have advantages not enjoyed by the other, and a locomotive might be built embodying the good features of both.

The Strong type of locomotive represents what is the most successful attempt yet made to remove the two worst defects of the American locomotive. These defects are insufficient grate area and fire-box heating surface, and an inferior steam regulation in the cylinders. The compound locomotive is not intended to remove these difficulties, but to increase the economy of operation by increasing the expansion of the steam. There is, then, no point of conflict in purpose or design in these engines. The compound principle, if found to be desirable for American service, can be as readily adapted to locomotives like the "Darwin," in addition to its other advantageous features, as to any other locomotive. The improvements embodied in the compound locomotive do not obviate the necessity for, or conflict with, the improvements represented by the "Darwin," even when all are incorporated in the same design. All await the trials of the compound locomotive with great interest; meanwhile the Strong type is in actual service, showing in a practical way to the general observer its points of advantage, which are perceivable in daily use, and the recent favorable reports of the operation of this new locomotive lead one to believe the design to be worthy of a fair and impartial trial in the severest American railroad operation. In economy, it has, in the rough and every-day trials, shown itself to be worthy of attention and investigation, and while such trials are not safe to accept as conclusive evidence, yet they indicate a possibility that in a series of scientific and accurate tests this new type of locomotive will show a gratifying increase in economy both in steam and fuel over the average American express engine.

It must be conceded that such economy is to be expected from a locomotive which has immense grate area and heating surfaces, the very essentials of economical fuel consumption, and which also has separate exhaust and steam valves which can be so constructed as to enable the regulation of steam to approach the ideal. Locomotive designers may hope to obtain information soon from the trials of this locomotive which will enable them to determine more satisfactorily than ever before the effect of large heating surfaces, large grate, and a near approach to the theoretical steam regulation, upon the economical operation of locomotive engines.

Export Rates.

There is one feature in the export rate question which has been generally overlooked, but which may prove of great importance if the Commission should attempt to take radical action in this matter. Some of the railroad companies have had a more or less direct interest in connecting steamship lines running to foreign ports. This has been, perhaps, most conspicuously the case with the Pennsylvania in times

past; but it has not been wholly unknown on other roads. If a ruling should be made compelling a division of the through export rate into its railroad and steamship proportions, the companies which thus controlled steamship lines would have an enormous advantage.

Suppose that the inland rate on a certain class of goods from Chicago to New York is 25 cents, the steamship rate from New York to Liverpool 10 cents, and the direct Chicago-Liverpool rate 80 cents. If the Commission should compel the through rate to be divided, the railroads could not afford to take less than 25 cents, unless they were willing to lower their whole system of domestic rates. The steamers probably would not take five cents, unless competition were much more active than it is to-day. The railroads could not pretend to let the steamships have ten cents, and then arrange for a rebate of five cents, because they could be so easily found out and punished. An increase of the through rate would apparently be inevitable under these circumstances.

But if the railroad and the steamship line were controlled in the same interest, the case would be different. If a through export rate of 30 cents were profitable, it would make comparatively little difference how it was divided—whether 20 cents went to the railroads and 10 to the steamships, or 25 cents to the railroads and 5 to the steamships. Whatever was lost at one end would be gained at the other. In the case assumed the latter alternative would be adopted. The 25 cent rate would leave the railroad sufficient freedom in its domestic tariffs, subject as they are to the provisions of the Inter-state Commerce act; the 5 cent ocean rate would not tie the hands of the steamship agents, because charges on foreign commerce are regulated by no laws save those of political economy. If they could find anybody else who would pay them 10 cents for the same service for which they charged the railroads 5 cents, they would be at liberty to exact it.

The same kind of result was seen in practice two years ago under somewhat different circumstances. When the short-haul clause was first put into operation, the charges for coal shipments from Pennsylvania mines to New York were considerably raised. This increase bore hardest on the independent mine-owner. If it cost him two dollars a ton to produce coal of a given grade, and the railroad charged him a dollar and a half, he could not lay down his product in New York for less than \$3.50. But the railroad was not thus hampered. If this charge of a dollar and a half allowed a margin of fifty cents above direct operating expenses, the railroad could easily deliver its own coal at \$3.25, or even lower. For though the short-haul clause prevented it from lowering through rates unless it was prepared to do the same with local rates, it did not prevent it from selling different parts of its product at different prices. If a company mined coal at a cost of \$2 and sold it for \$1.75, it lost 25 cents on this part of the transaction; but if the same company received \$1.50 for carriage when the direct cost was \$1, the result of the two transactions together was a gain instead of a loss. It was, in fact, wholly immaterial to the road whether it sold its coal at cost and charged a rate of \$1.25, or whether it sold at 25 cents loss and then charged a rate of \$1.50. The difference affected the independent mine owners. In the former case they stood on an equality with the railroad; in the latter case they did not.

In precisely the same manner a combined railroad and steamship company could compete for foreign trade on terms which it would be impossible for the two companies, acting independently, to meet. The more strictly the division of inland and ocean rates was enforced the more severely would this inequality be felt. This would have the indirect result of compelling railroad companies to consolidate with connecting steamship lines if they wished to keep their share of the foreign trade. We do not believe that this result would be desirable. Past experiments in this direction, though cautiously and honestly managed, have not been altogether fortunate. It is best to lessen rather than increase the inducements for railroad companies to engage in outside business. If the directors are honest men such business furnishes a chance for serious mistakes of judgment. If they are dishonest, it opens the door for all sorts of private speculations. Especially is this true of a business like the ocean carrying trade, where the plant involved is of enormous cost and the fluctuations in its value even more sudden and unpredictable than those of railroad property itself.

If there were an important object to be gained it might perhaps be worth while for the Commission to pursue its course without regard to these risks. But we cannot see that the object is sufficient. The worst

evil connected with the practice of making export rates independent of inland rates is the danger that this difference will lead to other more arbitrary differences of treatment. The direct effect of the practice on the industries of the country we believe to be generally good. If we are to dispose of our surplus wheat in the world's markets we must do it on the world's terms. Prohibit the railroads carrying it cheap enough to meet those terms, and they cannot carry it at all. This will doubtless be a great pleasure to the Grand Trunk people and to the lake and canal boat owners. We cannot see who else is to gain by it. The idea that the result will be a reduction in domestic wheat rates is not tenable.

To reduce inland rates to the proportion of the export rates would be almost as bad as limiting local rates by the *pro rata* proportion of the through rate. The result would be either a partial abandonment of the export business, with lessened volume of traffic for the roads and increased difficulty for the producers in disposing of their surplus product; or a consolidation of rail and ocean transportation lines, with its many possible abuses, of which those that we have outlined form but a small part.

We trust that the Inter-state Commerce Commission will proceed with the utmost caution in this matter.

The Time Convention.

The work accomplished at the Time Convention will mark the meeting as one of the most important ever held by that body. As expected, the report of the Committee on Car Mileage and Per Diem Rates was the chief subject discussed. From the report of this Committee, which will be found nearly in full on another page, it will be observed that the recommendation is for the adoption of the mixed plan at $\frac{1}{2}$ cent per mile, and 10 cents per day, the per diem part of the rate having been reduced from 15 cents to 10 cents, as compared with the previous recommendation of the Committee. This action was probably influenced by the recommendation of the Per Diem Committee of the Car Accountants' Association, which called attention to the fact that statistics collected from a large number of roads showed that a per diem charge of 15 cents would so largely increase the cost of car hire to many roads as to make the system burdensome, while the 10 cent rate with a very little increase of car movement would keep the balances about where they are now. The Committee's recommendation that the $\frac{1}{2}$ cent per mile and 10 cents per day rate be put in effect on Jan. 1, 1890, by all roads members of the General Time Convention, to continue at least one year was, after full discussion, adopted by the Convention. It is true that the adoption of this recommendation does not obligate all roads members of the Time Convention to put the system into operation on the date named, but an examination of the replies of the roads as to their position with reference to the per diem question, shows that 86 roads, which own about one half of all the freight cars in the United States, are ready to act on the approved plan. There appears to be but 40 roads, out of 177, on record as opposed to the Committee's recommendation, and these only own 145,167 cars out of a total of 792,025, while they operate 24,387 miles of road out of a total of 118,850.

The situation, therefore, seems to indicate that there will be at least 100 roads, owning more than one-half of all the freight cars in the country, who will start out on Jan. 1, 1890, to give the recommended plan a fair trial. It is altogether likely that many roads not members of the Time Convention may also co-operate in the movement. That the results will be most gratifying to the large car owners and to those roads whose yard facilities are now cramped, is virtually proved beforehand by the very great improvement shown in the handling of cars at Chicago and Omaha since the inauguration of the car service bureaus at those points.

The Committee's stand on the demurrage question is firm, and is, of course, amply justified. Their recommendation was adopted by the Convention, to take effect Nov. 1, 1888, the date being postponed one month from that recommended, in order to give the Committee time to prepare a form of organization, blanks, etc., and bring them before the October meeting. While demurrage is essential to a per diem system, it is to be remembered that it is not an equitable substitute for it. The demurrage bureaus will belong essentially to the traffic department, while the per diem interchange system will belong to the transportation department, affecting the movement of both loaded and empty cars at non-competitive as well as competitive points. From the various discussions of the ques-

tion and statistics collected during the past two years, one gets the impression that much of the unsatisfactory service is due to lack of effort on the part of many roads; marked inequality of service is seen on different roads, whose local conditions are very similar. The per diem charge is needed therefore to spur up all roads to their best efforts, and to induce them to put forth these efforts uniformly at all points. It is eminently sensible, however to introduce demurrage before trying a per diem system, for obvious reasons.

The election of Col. Haines to the presidency of the Convention for the third time is only a just recognition of his ability in that position.

The Western Shipper's View of the Railroad Question.

It is rare that an article written from the standpoint of the Western shipper shows an appreciation of the other interests involved in the railroad question. An editorial in the *Pueblo Dispatch* some weeks ago forms an exception to this rule. Its presentation of one view of the case is so clear that it is worth quoting and criticizing:

"Viewed from a New York or Boston standpoint, the question is this: Have the legislatures of Iowa and Colorado a right to regulate the management of valuable property owned by New York and Massachusetts citizens? Viewed from a Des Moines or Denver standpoint, it is: Have persons living in the East a right to manage the railroads of Iowa and Colorado oppressively to the people of the states, and wholly in the interest of the distant seaboard?"

"If natural competition has made rates too low, this is because there are too many roads for the business—and who is to blame for this but the builders and owners of them? It is argued that the capitalists of the Eastern states have put their money in Western roads, and they are entitled to a fair return on the investment. As a general statement, this cannot be denied; but if eastern capitalists have built two roads where there is sufficient business, at present, for only one, is it right that the people living along the lines should be taxed in charges enough to pay dividends on both?"

We are glad to present this to our readers, because it will show railroad men, and especially those in the East, how matters look to fair-minded people at the other end of the line. We are also glad to use it as a text for criticism.

The question here asked is simply part of a more general question as old as property law itself. Whether the management of capital should be regulated by those who own it, or by those who enjoy its services. Experiments have been made in both directions, and are still being made; but on the whole, the system which gives the owner of the capital control of the industry has succeeded, and that which gives the purchaser control of the industry has failed. For that reason, laws which recognize the former class of rights have survived while legislation of the other sort has not.

It is easy to see why this has been so. While there may be at times an abundance of capital seeking investment in particular lines, this is not the normal state of things. There is apt to be a scarcity of capital rather than an over-abundance. Any system which does not give control to the owners makes it very scarce indeed. As a matter of course people are not so economical with other men's capital as they would be with their own. They allow it to be wasted by fraud, or to be used in works which are not necessary. If we follow out the history of such attempts, from the smallest co-operative store up to the largest municipality in the country, we shall find sufficient instances of this truth. If you give a man who has no capital the chance to vote on the conditions by which he may use somebody else's capital there will be inadequate return of that which is invested and inadequate supply of such additional capital as is needed in the future.

The same fact has shown itself in railroad history. In the Granger legislation of fifteen years ago the railroads were not allowed to make a scale of charges such as was demanded by the conditions of the time. The state authorities made palpable mistakes—more from defective understanding of railroad economy than from any desire to treat the owners of the roads unfairly. The result was that capital would not come in for further investment. Where the legislation was worst, the failure of the supply of new capital was such as to cause general disaster. There was nothing to do but to repeal the laws. Great fluctuations had been produced which harmed many legitimate interests and benefited none. The development of the state had been retarded. The chief gain had been a little experience, which unfortunately seems to have lasted only about ten years. It is, however, worth noticing that Wisconsin, which in the former movement was worse off than almost any other state, now has a board of commissioners whose action and intel-

ligence contrast most favorably with that of many of their neighbors.

The system which gives investors control of their property may be abused. But the danger to the community from this abuse, serious as it may be, is not for a moment to be compared with that which arises if the Legislature attempts to take all control out of the investors' hands. It is not "right" that people living along the lines should be taxed in charges enough to pay dividends on both, and they are not likely to be. Any power which the Interstate Commerce Railway Association may have to secure increased rates is extremely limited. But there is a most severe danger that when the Legislature takes things into its own hands rates will be fixed too low to pay any interest at all. This result, instead of being slight and temporary, is almost sure to be carried to an extreme, and the danger to the community from this extreme is far greater than from the other.

If it were true, as implied by the *Pueblo Dispatch*, that the chance for dangers from both parties were equal, much could be said for the view of the subject there taken, but the dangers are not equal. The chance of mismanagement of the property by the shippers' representatives is, on the whole, far greater than the chance for mismanagement by the capitalists' representatives. The latter, even if attempted, soon causes a reaction against itself by bringing in competing lines, and thus stimulates the growth of the country at one point even if it may have retarded it at another. On the other hand, the uncontrolled power of the legislature to reduce rates is subject to no such check. There is nothing to stop it until it reaches a point where it prevents the investment of capital. Then the community finds its mistake and repeals the legislation, but the harm done has been irreparable, vastly greater than could be done by any duplication of unnecessary lines or by all combined attempts to evade the pooling clause of the Inter-state Commerce act. In the interest of the shippers quite as much as of the investors it is important that the control of the capital should be kept out of the hands of those who feel no direct responsibility for making it secure.

A novel scheme, and one which will be of interest to superintendents and general managers who have not already investigated it has lately been brought forward. It consists in a plan for insuring railroad companies against losses on rolling stock in wrecks. The gentlemen who have perfected this scheme, and who are fire insurance experts, are confident that they have an idea which will prove profitable to the railroads as well as to themselves, and one which will meet the approval of railroad officers. They propose to pay only for direct losses resulting by accidents, and on rolling stock only. Their policies do not insure against fire losses and do not cover the contents of cars. Damage to bridges or right of way is not included, and incidental losses like detention of trains or loss of traffic are of course too indefinite for consideration. Locomotive boiler explosions and breakage of machinery of engines which are unconnected with a derailment or a collision or other external accidents are also excepted. The company limits its liability to \$25,000 on any one accident, and from every loss \$100 is deducted in making payment. This eliminates all small breakages such as broken draw-gear, etc., where the collection of proofs would be more costly than the case would warrant.

The principle of spreading payments for emergency losses over the whole year is now very widely recognized, the insurance of all property from loss by fire having become very much more common with railroad companies during the last ten years than it was before. The fact that the property of railroad companies is so widely scattered places them in a peculiarly advantageous position to do their own insuring, but the added sense of security and satisfaction afforded to officers by arranging for their outgoes in this line in regular periodical payments apparently is of sufficient value to make it worth while to pay the insurance company a consideration. At first thought, it might seem that a superintendent who felt that a big wreck would not make a great increase in his expense account would be tempted to relax his vigilance. But it is to be remembered that the danger to human life and limb is not involved in this insurance question, so that all humane considerations are unchanged. The bills for loss and damage to freight are also unaffected by the new scheme. There can be no doubt that fire insurance has diminished rather than increased the frequency of fires by the inspections and regulations enforced or recommended by the insurance companies, and this principle would undoubtedly finally prevail in this new form of insurance. That is, the investigations of the insurance company into the administration, organization and equipment of the railroads would constitute another force tending to raise the standard of safety. Moreover, the reputation of the operating officers, which is their most valuable capital, and the chief end of their ambition, would not be guarded by any form of insurance. Much more might be said on both sides of this question, but on the whole, we should say that the objection that under this system the care to avoid accidents would be diminished is purely fanciful.

The organizers of this enterprise have already made contracts with a few eastern railroads, and we understand have

negotiations pending with several others. They will submit a form of policy to any railroad company which will send to them its latest annual report. The fact that some roads are better equipped with safety appliances than others and that therefore rates for different degrees of hazard would sooner or later become a necessity to an insurance company is an important consideration in this scheme, but it is one which can be discussed more intelligently after the scheme has been more widely tried.

In view of the more extended use to which radial trucks are being put, particularly in passenger service, we wish to call attention to a minor improvement designed to facilitate the repairs of the leading pins of such trucks. The pin which connects the end of the radius bar with the cross-ties on the frames is a detail which is continually a source of trouble, and when it becomes loose the truck and radius bars rattle and rapidly wear the pin. A failure of this pin will produce an accident of the worst kind, and probably the derailment of the locomotive. In order to render this detail as durable as good precaution would require, the mechanical department of the Pennsylvania has for some time been using a hardened bushing in the end of the radius bar, through which the hardened fulcrum pin passes. The use of the bushing reduces considerably the time needed for repairs.

In connection with this it is well to note one of the difficulties with radial axle boxes as recently stated by an English railroad journal. It is claimed that the axle boxes give trouble by sticking; i. e., when they have been running for some time in one position it takes considerable effort to displace them, laterally, as is necessary when entering a curve. This causes the engine to have a side-blow or "yank" on such parts of the line, and gives the impression that there is something wrong with the track. There are many advantages incident to the use of the radial axle box in the place of the radius bar in two wheel trucks, but the points of superiority, from the standpoint of actual use, are not all in its favor.

During this year the Massachusetts Institute of Technology will erect a large four-story building for a mechanical laboratory, drawing-rooms and civil engineering department. It will be the largest structure of the kind in this country, and will furnish the already crowded institution with room for the large class of young men now in the freshmen class. This technical school is unable to meet the present demands upon it, and further extensions will soon have to be made to keep pace with the rapidly growing list of applications for admittance. Such institutions as this are of inestimable value to the nation, and the demand for graduates from the institute, particularly from the mechanical department, far exceeds the supply, and all graduates from this department last year are now employed in the field for which they were prepared. It is an important and suggestive fact that every graduate of this institution costs the treasury of the corporation considerably more than his tuition and other fees amount to.

The trunk line presidents met at Commissioner Fink's office, on Wednesday of this week, and discussed live stock and dressed beef rates. No positive action was taken, but a resolution was passed recommending to Chicago roads an increase of east-bound live stock rates from 22½ to 25 cents, and that the mileage paid on private owners' refrigerator cars should in no case be over ¾ cent per mile. The resolution also recommended the increase of the rate on dressed beef, but nothing definite can be stated, as the whole has to come before the Chicago roads for final action. It appears that the Baltimore & Ohio has made contracts with shippers for the transportation of dressed beef which extend over five years.

NEW PUBLICATIONS.

The Duluth Daily News issues an illustrated annual edition containing, with some Zenith City literature, a great deal of information. The reason for Duluth's existence is that it is a point of transfer between lake navigation and the railroads. The best boats can now make the trip from Duluth to Buffalo in 3½ days carrying 90,000 bushels of wheat. The actual cost of running one of these boats, including everything, is placed by the News at \$120 per day. "This means that wheat can be carried from Duluth to Buffalo, if necessary, for one-half cent per bushel and leave a trifling margin of profit." This estimate, it will be noticed, does not return the boat, nor does it allow for insurance and depreciation. The up freights, on the other hand, when they are obtained, probably would allow a profit at 2 cents. The elevator system of the city, with a capacity for 20,800,000 bushels, seems to be well devised to expedite the dispatch of vessels in the port, as it is stated that a vessel carrying 75,000 bushels of grain has been loaded in an hour and a half, and the propeller "Onoko," carrying 90,000 bushels, has left the harbor, with cargo trimmed and hatches closed, within five hours from the time she drew alongside the elevator, while 2,300 tons have been unloaded from the "David Dows" in 15 hours. The shipments of grain for 1887 were 19,721,463 bushels, as compared with 1,453,674 in 1880. On account of the frost, shipments in 1888 were less than in the previous year, reaching only 13,642,116 bushels, of which 545,111 bushels were of corn, oats and barley, principally corn. The coal received in 1888 was 1,535,000 tons, as compared with 31,000 tons in 1878. The arrivals and clearances for 1888 were 2,200 vessels, with a tonnage of 1,943,236 tons, their average register being 887 tons. It will surprise some to be told that "70 trains per day are required to carry passengers to and fro between the outlying sections of the city, the adjacent towns and the city's business centre."

TRADE CATALOGUES.

Pocket Reference Book of Interlocking and Signaling Devices. The Union Switch & Signal Co., Swissvale, Pa.

This little pocket book is preliminary to a more comprehensive edition that will be issued shortly. It is a conveniently classified catalogue from which customers may order any one of the many parts, small and large, which enter into signaling apparatus; but farther it is a very good general handbook of the art. In it are described the various interlocking machines made by the company and also typical schemes of interlocking, and from it any one can get a very good and accurate general knowledge of principles and methods. The machines described in detail are the Saxby & Farmer, the Stevens, the Hambay and various novel apparatus for special places. The Hambay is a new machine which appears to us to have great merit. The locking is so arranged that it is all easily got at for changes or repairs, and any one bar may be taken out without disturbing any other.

The block signal apparatus with electric locking is also described, and various electrical appliances used in connection with mechanical locking. Switch stands in great variety are shown, as well as numerous movements for special purposes. This little handbook gives one a realizing sense of the extent to which the art of signaling and interlocking has grown within a few years.

Car Heating.—The McElroy Car Heating Company, of Albany, N. Y., publishes what is called a preliminary catalogue, explaining briefly the McElroy system of heating by steam-heated water and also the system of heating by steam direct. Letters are published from various railroad officers giving opinions of the results of the use of this system the last winter. It will be remembered that the peculiarity of the McElroy system is the introduction of steam to heat the water in the Baker or other system, by means of an ingenious "commingler." The circulation of hot water by this method is quickly established, without noise, and the change from the use of steam from the locomotive to the Baker heater may be made with perfect convenience and no delay. The past winter has been a trying one for all the heating systems in a way not anticipated, that is, it has tried severely their capabilities for regulation, and in this particular the McElroy system appears to have been very satisfactory. The company announces in this catalogue a new system of "live steam" heating, with which the heat in the cars will be automatically regulated. This will be offered to the railroads for the coming season.

Illustrated Catalogue of the Chattanooga Machinery Co., Founders, Engineers and Machinists, Chattanooga, Tenn. This is mostly a catalogue of saw mill material, but contains a number of machines useful in car and other shops, such as scroll and swing cut-off saws, rip sawing and resawing machines, etc. The very simple and efficient Nisbet steam pump is shown, and described in considerable detail. There are also price lists of hangers, pulleys, shafting, etc., and several pages of "useful information" concerning steam engines and boilers. The company are not only dealers in machinery, but designers and makers.

List of Patents Controlled by the Westinghouse Electric Co.—This is a circular to agents, designed to supply them with ammunition for discussion and explanation of the position of the Westinghouse Electric Co. It explains very briefly the relations of this company to two or three others, but the really remarkable part of the document is the numerical index of patents owned or controlled by the Westinghouse Co. Without actually counting them all we estimate these patents to number at least 650.

Steel Roofing.—The illustrated catalogue of the Canton Steel Roofing Co., Canton, O., describes the Smith patent roofing, and gives some information as to its cost and advantages. The same company makes corrugated iron for roofing and siding, and special shapes of various kinds for ceilings, cornices, etc.

The New Decatur Shops of the United States Rolling Stock Company.

The United States Rolling Stock Co. will begin work about May 1 in its shops at New Decatur, Ala., with a force of 600 men. The capacity of the shops at the start will be 15 cars per day. This new and important establishment is uncommonly well arranged and equipped, and a brief description of it will be found interesting to many of our readers.

The shops cover 50 acres, the greater area of which lies back about 2,000 ft. from the river, there being, however, a frontage on the Tennessee River. The plant will be devoted to building freight cars of all kinds, cabooses and refrigerators included. The buildings now completed are as follows: Wood-working mill, 500 ft. x 105 ft.; erecting shop, 500 ft. x 105 ft.; truck shop, 100 ft. x 80 ft.; forging and castings shop, 100 ft. x 80 ft.; blacksmith shop, 300 ft. x 90 ft.; machine shop, 200 ft. x 90 ft.; bolt-making shop, 80 ft. x 60 ft.; bolt-cutting shop, 80 ft. x 60 ft.; four-roomed lumber-dryer, the holding capacity being 200,000 ft., and the drying capacity per day about 50,000 ft.; store-house (two stories), and office building.

The following additional buildings will soon be completed: Car repair shop, 700 ft. x 60 ft.; foundry, 224 ft. x 112 ft.; paint shop, 500 ft. x 105 ft.; planing mill, 130 ft. x 100 ft.; together with such necessary buildings as oil house, paint house, etc.

The wood-working mill, containing 90 machines of the

most approved type, will be run by a pair (double) of condensing, Fishkill, Corliss engines of 700 nominal horse-power. The machine, bolt making, bolt cutting and blacksmith shops will be entirely independent of these engines, being run by a single engine of the same manufacture of 100 nominal horse-power.

The ground not taken up by the buildings will be laid in track, and when completed the yards will have 10 miles of rails. The whole plant will be well drained by a thorough sewerage system with 1½ miles of sewer pipe. Water for steam and other purposes is supplied from the Tennessee River and also from an artesian well 176 ft. deep. The tank has a capacity of 125,000 gallons.

The boiler house, with a battery of eight boilers, is a brick structure, 50 ft. x 40 ft., with two story bin for coal and shavings. The wood mill will be piped throughout and the shavings carried direct to the boilers or to the bins, as may be desired. The stack (brick) is 123 ft. high.

Probably no other car shops in the United States have a better laid out plant or machinery so complete in all details. Every improvement known in car building is to be found there, and any defect or inconvenience that past experience has brought to light has been remedied in building the new shops.

The following is a list of machinery, furnished by Mr. George Place, for these works:

One pair 700 H. P. horizontal, condensing, Corliss engines, fly wheel pulley 18 ft. diameter, 78 in. face, turned for two belts, and carries two 36-in. belts; also one 125 H. P. Corliss engine; eight tubular boilers about 100 H. P. each; about 2,500 ft. of steel shafting, 360 hangers, 215 couplings, about 375 wood pulleys, made in two parts (Edison Machine Co.) In the wood-working mill about 75 of J. A. Fay & Co.'s latest and most improved car building machines; in machine shop about 40 of Bement, Miles & Co.'s latest and most improved iron machines and five or six smaller drills and some small lathes; in smith shop seven or eight Bradley cushioned hammers, large punching and shearing machines, Sturtevant blowers, complete plant of underground pipe, four bull-dozers or bending machines; from 30 to 40 latest and most improved bolt-making machines, such as bolt headers, bolt cutters, both double and single, and nut-tapping machines (National Machine Co., Tiffin, O.); in the tool room, Universal and plain milling machines, small lathes, drills, etc.; complete plant for drying lumber, of the Standard Progressive system; also 25,000 to 30,000 feet of best oak-tanned leather belting. The total cost of this material was about \$250,000.

The future of the town of New Decatur is promising. It is situated on two of the Southern trunk lines (the Louisville & Nashville and the Memphis & Charleston), and besides the car shops may be mentioned the following: Louisville & Nashville Railroad shops; Decatur Car Wheel Works, 100 wheels per day; American Oak Extract Works, horseshoe nail works, cotton compress, charcoal and coke ovens and the Ivens machine shop, together with a foundry which it is expected will shortly be started.

The Eiffel Tower.

The Eiffel Tower has been completed to its full height, but the lifts, electric lighting machinery and various other details are not yet finished. The height, exclusive of the flag staff, is 300 metres—984 ft. The structure is built of wrought iron, not steel, as might have been supposed. The total weight of the iron is 6,500 tons, 450 tons being rivets, of which 2,500,000 were used. Of these 800,000 were put in on the tower, the rest in the shops. All the field riveting was done by hand, and no drilling, punching or other artifices to make a fit were allowed on the work. All parts were required to fit accurately when delivered from the shops. All dimensions were independently calculated by several computers, and there are in the structure some 12,000 pieces, each made to drawings. The four feet on which the tower stands have an extreme spread of 340 ft. on each side of a square, and under these feet are placed hydraulic presses by which slight adjustments of the relative positions of the parts composing these four feet could be made as the work was riveted up. Presumably no such adjustments were practicable or necessary after the legs joined, as they did at a height of some 150 ft. The underlying ground is a bed of stiff clay, about 50 ft. thick, resting on chalk, and over this clay is a bed of sand and gravel. The foundations are carried down to this gravel. These foundations consist of 6 ft. 6 in. of cement concrete, on which are placed blocks of concrete 13 ft. by 26 ft. in plan and 23 feet high, with the top faces inclined inward. On those concrete blocks are two courses of cut stone 40 in. thick and on those rest the cast iron shoes from which the legs of the tower spring. Anchor bolts are carried 16 ft. into the concrete and there anchored to girders. For these particulars we are indebted to *Industries* (London).

The West Point Tunnel.

In the *Journal of the Association of Engineering Societies* for February appeared a paper on the West Point Tunnel, by Mr. William H. Searles, the engineer of the work. This, we believe, is the only complete account of the building of this tunnel ever published, and we reprint extended extracts from it.

The tunnel was located by the writer in March, 1872, under the disadvantages of high winds, low temperature (six to twelve degrees), and drifting snow. The precarious character of the approaches, the presence of the river at each end of the tunnel, and the obstruction to sight and measurement offered by several large buildings on the line, necessitated great care and patience on the part of the corps to secure trustworthy results. The instruments were an ordinary railroad transit and level, and New York rod, steel tapes adjusted for temperature, and flat-faced flags, with a spirit

level attached to each. The latter were used for plumbing in connection with the measurements, as a plumb line would have been useless in such windy weather.

All horizontal measurements were noted to one hundredth of a foot, and the angles were read by estimation to ten seconds. The tunnel tangent was referenced by a natural object sharply defined on the mountain across the river to the southward, and by an iron bolt on the shore across the bay to the northward. During the following summer the field work of the tunnel was carefully verified and was found to be accurate in every respect. Even on the curve, one end of which was 160 ft. higher than the other, the deflections struck the same centres, and the chaining came out on the final point to the identical one-hundredth of a foot. Nor did this remarkable result appear to be due to any compensation of errors of appreciable magnitude. There was a slight discrepancy in the test levels, such as might be expected.

The south heading was started on Nov. 1, and the north heading on Dec. 6, 1872. Shortly after this the steam drills were discarded and hand drills substituted, working only one shift of ten hours per day. There was, of course, no engineering reason for this, the object being to secure continuous operation at the least expense pending the sale of the bonds in Europe. No other portion of the road was under contract at this time. Thus the work dragged along all winter, until by the 1st of May, 1873, the south heading had 86 ft. to show for five months' work and the north heading only 53 ft. for four months. At this time work was abandoned by the company and the engineers discharged, but the contractor continued the tunnel excavation at his own expense and without engineering direction until the next September, when the panic of the memorable "Black Friday" put a stop to all operations. The progress from May 1 to September was 110 ft. at the south end and 126 ft. at the north end; but the bench was taken out also, finishing the tunnel full size to within about 30 ft. of the heading.

The work was not measured up until August 1, 1880, after an interval of nearly seven years. At this time the contractors resumed operations, having made a favorable contract with the new railroad company after receiving compensation for the old work done. The instrumental examination of the tunnel showed that it conformed tolerably well to line and grade. The work, so far, was all in solid granite, quite dry at the south end and with but slight dripping at the north end. The old monuments of the line at each end were readily found, though covered with debris, and the tunnel lines were carried forward from them without any further verification.

The theoretical section of tunnel as now adopted was 27 ft. wide between vertical sides, by 20 ft. 6 in. high at the crown above subgrade, and the floor was depressed 6 in. below subgrade along the centre line for drainage. The theoretical roof was a semi ellipse, with a rise of 9 ft. There was a rising grade of 0.10 per 100 from the north end and of 0.20 per 100 from the south end.

The work was now prosecuted with great vigor. An engine and boiler house was erected on made ground (for want of any better place) near the river at the north end. An air compressor of 150 horse-power was put in and set in operation by Aug. 1, 1880. The compressed air was conducted from the receiver by 4-in. pipes to either end of the tunnel. Ingersoll drills were employed, and the headings were illuminated by electric lights. Two shifts of ten hours each per day were adopted. The headings were continued at the roof and were made as wide as the tunnel limited by the arch form of the roof. The enlargement to grade followed about 30 ft. behind the heading. A track was laid at each end, and the broken rock was hauled away in dump cars by mules to the embankments in the river.

During the winter the compressed air passing through the long pipe to the south end became so cold as to clog up the exhaust of the drills with ice and prevent their working. A heating chamber of iron, supplied with a few coils of pipe, and heated by fire at the bottom like an upright boiler, was placed in the tunnel and the air made to pass through it on its way to the drills. This not only put an end to the ice on the drills, but also perceptibly increased the mechanical effect in their working at a trifling cost for fuel.

After Oct. 1 the progress in the south working averaged 119 3/4 ft. per month for ten consecutive months, the maximum monthly advance being 142 ft. in February, 1881. Could the same rate have been maintained at the north heading the tunnel would have been completed by August, but such was not the case. The material from the south end onward was solid granite with a few seams, and no water of any consequence. The north heading showed the rock more sandy and sometimes shattered and wet. It was necessary to take down a large extra amount of rock to make the roof safe. However, nearly the same progress was made here as at the south heading until Oct. 13, 1880, when a wet spot in the roof at Station 73, which had been discharging water and mud for several days, but which had been carefully propped with heavy timbers and was supposed to be safe, suddenly gave way, leaving a ragged hole some 8 ft. in diameter, through which poured down a torrent of saturated sand and gravel, which only ceased when the tunnel was filled to the roof at this spot, the slope of gravel reaching nearly to the entrance, 280 ft. away. The heading was about 25 ft. in advance of the break in the roof, but fortunately no men were there, all having just gone out to dinner, when the accident occurred.

The flow of material into the tunnel caused the grassy surface, 85 ft. above the roof, to cave in. A funnel-shaped hole, 50 ft. in diameter and 40 ft. deep, developed just north of the ordnance yard, undermining a portion of the cut-stone wall and one corner of the laboratory. As the hole was forming a workman, stepping to the brink, was drawn in and sucked through the vortex into the tunnel, where his remains were found unutilized some days later. Even his dinner pail was still in his hand.

The contractor began at once to excavate the loose material in the tunnel, but no sooner was the vent freed than fresh torrents of wet sand rushed down, filling the tunnel more completely than before, while the tunnel on top enlarged to 70 ft. in diameter and 60 ft. in depth. The surface material was hard pan to a depth of 20 ft., and prevented the sides from caving in any further. Below this there was evidently nothing but sand and water to within a few feet of the tunnel roof. To choke the hole in the roof large quantities of heavy timber and of tree tops loaded with large stones were thrown in from above until the movement of sand was arrested. The sides were then stayed with plank and horizontal braces. At the same time a small timbered drift was worked through the soft material in the tunnel, and after one month's labor the original rock heading was again reached. The hole continued to discharge a stream of water, and the roof was so weak as to require arching for a length of 70 ft. A segmental brick arch of 6 rings was used, resting on skew-backs cut in the native rock. The weakest part of the roof was supported temporarily by heavy wooden "bars" and struts. The bars were left in when the arch was built, and these caused the arch to leak at the crown by detaining the water there, although abundant "scuppers" were left for its discharge at the skew-backs.

The contractor afterward made an attempt to intercept this water by drifting into the west side of the tunnel near grade, and after going 25 ft., turning twice to the left and returning toward the tunnel, the drift being nearly as steep

as a staircase, so as to pass over the arch. But having reached a point over the west skew-back, and although still in solid rock, he feared to carry on the drift toward the crown, and so failed to stop the leak, although a large amount of water came down the "staircase." The leak in the arch continues to this day. The drift was extended south over the skew-back line a short distance, but without effect.

Nearly four months' time was lost by the accident described, so that by the first of February, 1881, the total advance of the north heading had been only 26 ft. since Oct. 1, as against 480 ft. in the south heading during the same time. But now the roof became firm and excellent progress was made for several months, and it was confidently estimated that the headings would meet in the following September.

About June 10, 1881, a drill working horizontally in the north heading broke through into sand, the rock terminating with a steep face nearly at right angles to the tunnel. The sand was not free from water. This event made an entire change of operation necessary. The drills and compressed air were withdrawn, and a plant prepared for tunneling in sand. The south heading came up to the sand about the first of August. There were then 365 ft. remaining between the headings. The first thing in order was to drive timbered headings to a meeting point.

This proved to be very slow work at first. The transition from rock to sand was accompanied with many difficulties and dangers. The pressure in the sand was enormous, and many of the "sets" showed distress and had to be doubled. Quicksand was encountered at the south heading, and proved so troublesome that the drift had to be carried to one side of the centre line to avoid the "pocket."

On the 19th of October, 1881, the headings met at station 71, or 982 ft. from the north end and 1,682 ft. from the south end of the tunnel. This drift was constructed several feet above the theoretical crown, so as to leave room for timbering the tunnel above the arch. Owing to the difficulty of transit work in the crooked drift the lines were 3 in. out when they met in the heading, but all discrepancies disappeared when the enlargement gave opportunity for a direct sight along the tangent. The levels met with great accuracy.

When the sand was encountered it was supposed that side walls supported by an invert would be required. In order to drain the invert a ditch three feet deep was blasted out of the floor of the tunnel, beginning at the north approach and reaching nearly to the sand section. Then it turned to the west and entered a drift that was made on the west side of the tunnel and about 20 ft. distant from the side of the tunnel for drainage. This drift was carried about 150 ft. at three ft. below grade, and was in solid rock all the way, much to the surprise of every one. It gathered a great deal of water, and drained the sand in the tunnel so as to greatly facilitate the work of enlargement. When the sand was reached at the south end a similar side drain was begun in the west wall of the tunnel, but depending on hand drills only it progressed very slowly, and was finally abandoned after reaching a length of 70 ft.

When the first sand in the tunnel was struck, borings were ordered from the surface to determine the question whether any more sand was to be encountered. The borings were made by driving down gas pipe, washed out inside by Green's driven well process. These pipes penetrated to different depths before striking rock, as indicated on the profile, but none of them came nearer than 40 ft. of the tunnel roof. The presence of the second sand proved how deceptive any borings are which are not carried down to the grade of the tunnel.

After the headings met as above described there was a delay of about two months before the difficult work of enlargement proceeded; meantime the drainage tunnels were prosecuted and materials collected for arching. Four caken logs, 2 ft. in diameter and 20 ft. long, were used for roof bars at each end of the work, and smaller logs for side bars. A stout brattice retained the face of sand in place in the usual manner. As soon as one length of roofing formed by the bars was in place, a length or section of about 12 ft. of brick arch was built under it, and after the spaces between bars had been built up from the arch to support the lagging boards, the roof bars were drawn forward, one by one, by means of a strong chain and screw, to form the next section of roofing, as in the most approved English practice. The spaces left by the roof-bars were then filled in solid with brick and slate chips. This work was carried on to completion without any serious break or mishap under the immediate superintendence of Mr. William White, since deceased, who also superintended the Musconetcong tunnel in 1872-3.

Contrary to all expectations, the sand through which the heading was driven did not extend down to grade. A rock floor above grade was found, obviating the necessity for an inverted arch. The side walls of brick were founded on solid rock throughout, and in some places the skew-backs could be formed in the rock. The arch had a five-centred intrados, conforming nearly to the normal semi-ellipse of 9 x 27 ft. It had a thickness of 9 rings at the springing lines, diminishing to 6 rings at the crown; it was built of hard-burned Haverstraw brick laid in mortar of Norton's cement. The ribs for the centring were built up of two thicknesses of two-inch oak plank in lengths or segments of 4 ft., breaking joints, with quarter-inch iron plates covering the joints, and four 1-in. bolts passing through each plate. The segments were carefully jointed to resist thrust. The chord of the rib consisted of two planks 2 in. thick, secured by bolts at the ends. The ribs had no radial supports, and where the skew-backs would resist the thrust, the chord pieces were omitted, giving an unobstructed tunnel below the rib. The ribs were spaced 4 ft. apart, except at the end of a section, where the spacing was 2 ft., to support the ends of the bars during the construction of the following section. But in the heaviest material a post was set under each drawing-bar, near the arch, as a precaution against any possible deformation. Enough centring was provided to serve two sections of the arch, and after the second was completed the centring was taken from the first section and used under the third, and so on. The brickwork was started at the north end of the arch on Nov. 25, 1881, and the first section of 12 ft. was finished on Dec. 2. The masons then built a section at the south end, while the miners prepared another section at the north end, and so the two gangs worked alternately at either end. It was not till the first week of November, 1882, that the closing section of the arch was finished. The progress during the year is recorded on the profile and also in the table appended.

Some trimming in rock work remained to be done, and the track to be laid, and the West Point tunnel was finally completed in December, 1882, just ten years after its first inception, and two and a half years after the resumption of work in 1880. Notwithstanding the difficulties encountered the work might have been done with more dispatch, especially during the last year, had there been any necessity for it; but the road-bed was not entirely finished elsewhere, and when the tunnel was open the construction trains used it for some time to carry material southward to unfinished embankments. It was not until the following June (1883) that regular traffic began to move through the tunnel.

The tunnel shaped hole at the surface over the first break was meanwhile refilled with earth, which had to be hauled in wagons more than a mile from the nearest available borrowing place. After the material had sufficiently settled to

sustain a foundation, the stone wall and government building were restored to their original condition, and all traces of the catastrophe removed.

TECHNICAL.

Locomotive Building.

The Schenectady Locomotive Works are running with a full force and turned out during the month of March 24 locomotives, as follows: Nineteen 18 x 26 in. eight-wheel, for the Union Pacific; three 18 x 24 in. passenger, and one 17 x 24 in. six-wheel switching, for the Cleveland, Columbus, Cincinnati & Indianapolis; one 9 x 16 in. inspection locomotive for the Delaware & Hudson Canal Co.

Last week the Schooner T. W. Dunn left Philadelphia loaded with ten locomotives, built at the Baldwin Locomotive Works, for the Provincial Railways of Buenos Ayres. These locomotives are of 5 ft. 6 in. gauge, and six of them are of the Mogul type, with cylinders 18 x 24 for freight services, and four of them are of the American type, with cylinders 17 x 24 for passenger service. The latter have driving wheels 6 ft. in diameter, and the tenders are fitted with water scoops. The Harlan & Hollingsworth Co., of Wilmington, Del., is filling a large order for passenger equipment for the same line.

The Portland Locomotive Works, of Portland, Me., last week completed two locomotives for the Maine Central.

The Rogers Locomotive Works, of Paterson, N. J., have delivered a 30-ton 14 x 24 locomotive to the East Louisiana road.

The Savannah, Americus & Montgomery this week received several of its new ten-wheel freight locomotives.

Two large engines have just been received by the Union Pacific from the Schenectady Locomotive Works.

Car Notes.

The Southern Car Works are to be extensively improved by the addition of a foundry and other departments. Mr. H. M. Perry will have the management, beginning about May 1.

The Laconia Car Co., of Laconia, N. H., is busy with orders for 10 passengers for the Boston & Maine, 10 box cars for the Cheshire road, and 100 freight cars for the Upper Coos R. R.

The Hinson Car Coupler Co. has received an order for 100 draw-bars from the Youngstown Car Mfg. Co., of Youngstown, O.

Bridge Notes.

The Keystone Bridge Co., of Pittsburgh, Pa., has recently completed for the Kentucky Union road an iron and steel bridge over the Red River, near Clay City, Ky., which has a span of 150 ft. The company is also erecting a bridge, 550 ft. long, across the north fork of the Kentucky River, near Beattyville, for the same road.

The Smith Bridge Co., of Toledo, O., has been awarded the contract for the iron superstructure for the bridge over Blanchard avenue, at Findlay, O., on its bid of \$3,790. Fifteen companies bid on the work.

Proposals are wanted by the city engineer of Cleveland, O., until April 25 for the erection of a Howe truss swing bridge over the old river bed at Willow street.

The Western New York & Pennsylvania is to construct a new iron bridge at Plymouth avenue, Rochester, N. Y.

The contract for the construction of the superstructure of the lift-bridge at Waterford, N. Y., has been awarded to the Hilton Bridge Construction Co., of Albany, N. Y., at \$6,600. The other bidders were: King Iron Bridge Co., Cleveland, \$7,974; Groton Bridge & Manufacturing Co., of Groton, at \$7,280.

The County Committee asks proposals until April 17 for the construction of a wrought-iron low truss bridge near Bordentown, N. J.

Contracts will be awarded on May 13 for building five iron bridges in Lavaca County, Tex.

The Groton Bridge Co., of Groton, N. Y., has been awarded a contract to build an iron bridge at Laurel, Md.

A new iron bridge is to be built at Seneca street, in Buffalo, N. Y.

The Louisville Bridge & Iron Co.'s machine shops at Louisville, Ky., were completely destroyed by fire at midnight, April 8, causing a loss of \$90,000; insured. The fire is supposed to be incendiary.

Manufacturing and Business.

The new addition to the forge shop of the Billings & Spencer Co., of Hartford Conn., will be of brick, 90 ft. long by 40 ft. wide, and will contain 15 new hammers. This will increase the capacity of the forge shop to 55 hammers. The company now makes 50 styles of drop-forged steel wrenches, and 12 sizes (3/4 to 4 in.) drop-forged steel lathe dogs, and it also manufactures the Billings and the Packard improved ratchet drills. The entire plant is now lighted by electricity, two dynamos being used, one running 20 arc and the other 150 incandescent lights.

The Cooke Locomotive & Machine Co., of Paterson, N. J., is putting in a 200 H. P. Sterling vertical water-tube boiler for testing locomotives. These boilers are specially adapted to high pressure and are manufactured by the International Boiler Co. Ltd., of New York.

The National Railway Supply Agency has been organized at Belleville, Ill., by T. B. Wilson and others, with a capital stock of \$100,000 to deal in general railroad supplies.

Byram & Co., of Detroit, are meeting with much success in the manufacture and sale of the "Colliu" cupola; one day's mail last week brought orders for five of the "Colliu" cupolas from different parts of the country.

Hilles & Jones, of Wilmington, Del., have lately built several large vertical milling machines for the Maxim Nordenfellt Gun & Ammunition Co., Limited, London, England.

The Mason Regulator Co., of Boston, has recently removed its office to commodious quarters at 10 Central street.

The Pirtsch system of lighting cars by compressed gas was shown at the Time Convention, held this week at the Hotel Brunswick, New York City. Mr. St. John was in charge of the exhibition.

Iron and Steel.

The new works of the Roanoke Rolling Mill Co., at Roanoke, Va., are approaching completion.

Carnegie Bros. & Co., of Pittsburgh, Pa., have bought an interest in the Wallingford Iron mines, in the town of Wallingford, near Rutland, Vt. The former owners retain a half interest in the works.

The Duquoin Iron Works Co., of Duquoin, Ill., has been chartered for the operation of an iron foundry and machine shops, by George F. Blakeslee, and others.

Bids were opened at the Navy Department last week for the construction of an armored coast defense vessel of the monitor type and of about 4,000 tons burden. The bidders for constructing the hull and machinery according to the

Department's designs were: William Cramp & Sons, Philadelphia, \$1,614,000; N. F. Palmer, Jr. & Co., (the Quintard Iron Works) of New York, \$1,690,000; the Union Iron Works, of San Francisco, \$1,628,950. No award has yet been made.

The National Tube Works Co., of McKeesport, Pa., is erecting 20 additional puddling furnaces at its plant, which, when completed, will give the company over 100 puddling furnaces. The new plate mill recently completed will be put in operation very soon.

M. V. Smith, of Pittsburgh, has just completed a contract for three of his improved regenerative gas furnaces and four gas producers for Carnegie, Phipps & Co., at Beaver Falls. This makes six regenerative gas furnaces and seven artificial gas producers in these works.

The Rail Market.

Steel Rails.—Eastern mills have made only a few small sales, but in the West an order for 10,000 tons delivered at Toledo is said to have been divided between the Chicago mills and the new Pittsburgh mill, 4,000 tons going to the former and 6,000 to the latter. The Chicago mills have received no large orders recently, but it is thought that within the next 30 days some large sales will be made. Quotations in the East remain unchanged at \$27@27.50; Pittsburgh quotes \$28 at mill, and at Chicago the quotations are \$30@30.50.

Old Rails.—A lot of 6,000 tons of old rails are said to be held in the East, waiting for a better market; 4,000 tons in Pittsburgh and 5,000 tons in Maryland and New Jersey are also said to be held under the same conditions. There is little demand, large lots being offered in the East at \$22.50, and in Pittsburgh at \$23; in Chicago sales have been made at \$20.50@20.80.

Track Fastenings.—At Pittsburgh, splice bars are quoted at \$1.75 and spikes at \$2.

Deep-Water Harbor on the Gulf of Mexico.

In compliance with the resolutions adopted by the Fort Worth and Denver conventions, a commission of United States engineers has been appointed to examine the north-west coast of the Gulf of Mexico with reference to selecting a site for a harbor with a channel depth of from 25 to 50 ft. The members of the commission are Col. Henry M. Robert, Col. Jared A. Smith and Major Geo. L. Gillespie.

A School of Firing.

The Chicago, Burlington & Quincy Railroad has started a locomotive firing school for the purpose of educating its firemen in those methods of firing which are most economical for the railroad company. In order to facilitate the instruction, the school has been started in a car which was formerly used as a dynamometer car and in this car the instructor, Mr. Baker, travels from point to point of the line and examines the firemen and gives them instruction in the same manner as the air brake instructors, only without the apparatus. In this class of instruction, the same as for the automatic brake, there will be a system of marks and those having attained the greatest familiarity with the theories and nomenclature of scientific firing will be given the highest marks and the preference in promotion. This school has been in operation for two weeks and each day several classes are brought in to listen to the lectures and directions relative to the subject.

THE SCRAP HEAP.

Notes.

A heavy storm of snow and rain prevailed in Western Pennsylvania and Virginia on April 5 and 6. On the Chesapeake & Ohio many miles of telegraph line were blown down, and on the Richmond & Danville a train was derailed by a washout, killing two men.

On May 1 the Chicago, Burlington & Quincy will consolidate the freight run from Galesburg to Burlington and that from Burlington to Ottumwa into one run, having a total length of 119 miles. Twenty crews will move from other points to Galesburg.

A special inspector was recently sent out by the Government to ascertain what railroads at Suspension Bridge were violating the Alien Contract Labor laws. The roads were all cautioned, but some have paid no attention to the warning. On Friday last Collector Cutler reported to the Attorney-General the Michigan Central, the West Shore and the Grand Trunk roads for prosecution. The Collector of the Port of Detroit is said to have entered similar complaints. The infringement of the law is alleged to have been in bringing over Canadians from Niagara Falls, Ont., and Clifton, Ont., to work in the yards of the roads at the bridge. The employment of conductors who live in Canada to do work on this side of the river on trains is in some respects a parallel case, but that has never been questioned by the government.

The freight houses of the Boston & Lowell Division of the Boston & Maine in Boston were destroyed by fire April 9, only a portion of the walls remaining. The buildings were filled with merchandise, including a large quantity of oil vitriol, and the frequent explosions served alike to intimidate the firemen and cause the rapid spread of the flames. Forty freight cars, many of them loaded, were destroyed before they could be removed to a place of safety. The loss will reach \$500,000. The fire was first discovered in a bale of cotton.

Production of Lead in the United States.

Mr. C. Kirchhoff, Jr., issues the following figures of the production of lead in the United States:

As compared with a series of years, the production in 1888 was as follows, in short tons of 2,000 lbs.:

	1878.	1885.	1886.	1887.	1888.
Desilverized lead.....	61,290	107,437	114,829	135,552	151,465
Non-silveriferous lead...	26,770	21,975	20,800	25,148	29,090
Total.....	91,060	129,412	135,629	160,700	180,555

The total given under "desilverized lead" is the aggregate of the returns of every desilverizing works in the country.

His office is indebted to the Bureau of Statistics for the following figures relating to the amounts of lead returned by collectors of customs as contained in silver-lead ore imported from Mexico during the calendar year 1888:

	Pounds lead.	Value.
Corpus Christi, Texas.....	5,629,780	\$49,170.10
Pas del Norte, Texas and New Mexico..	41,647,291	\$32,944.00
Suluria, Texas.....	9,995,300	\$4,438.00
Total.....	57,272,371	\$86,552.10

In the calendar year 1887 the Mexican imports were estimated at 15,000 tons, so that the greater part of the enormous increase in 1888 is due to the receipts of lead in Mexican silver-lead ores imported duty free.

South African Railroads.

Tenders are asked for the earth work and masonry of the Natal Government railroad from Newcastle to the Transvaal frontier. And the Natal Government has given notice that they will introduce a bill providing for the admission into Natal, free of duty, of all material required for the construction and maintenance of railroads, telegraphs, bridges and other public works in the Orange Free

State and South African Republic. This looks like a move against the extension of the Cape Colony roads, as that Government, so far, insists on collecting duties on all of the Boer imports. In the mean time the railroad from Delagoa Bay is not being extended and complaints are made against both the concessionaires and the authorities of the Transvaal Republic.

Farmers Sentenced for Robbing Trains.

A dispatch from Winamac, Ind., April 6, says: Calvin Harless, August Newman, Charles Kring, Wellington Harmon, Peter Harmon and Charles F. Hanniger, farmers, were found guilty yesterday of grand larceny and each sentenced to serve one year in the penitentiary. Their crime was the pillaging of goods from way freight trains on the New York, Chicago & St. Louis Railroad, to the amount of \$3,000 or more.

It Has Come.

An electric brake was tried the other day in Pennsylvania which is said to have brought the train to a dead stop "almost instantly." The reporter adds that "the railroad men predict the instant success and adoption of the new brake."

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Mississippi the preamble of an act of the legislature creating a corporation declared the construction of a railroad through a certain part of the state to be a work of great public importance, and recited that the difficulties of construction had been such that no private company had been enabled to establish it. The act then created the corporation for the construction of the road, and "to make certain in advance of such investment, and as an inducement therefor, the taxes and burdens which" the state would impose thereon, granted an exemption from all taxes for a certain term of years. The Federal Court holds that the exemption was irrevocable. But the charter providing that the company "shall be exempt from taxation for a term of 20 years from the completion of said road to the Mississippi River, but not to extend beyond 25 years from the date of the approval of this act," the exemption does not begin until the road is completed to the river.¹

The Court of Appeals of Kentucky rules that under the state law, taxing the railroads of the state specifically at the rate of \$20,000 per mile, each railroad is regarded as an entirety, and not subject to fragmentary taxation, hence they are not impliedly subject to local taxation or by a statute authorizing a county to levy and collect *ad valorem* taxes on all property in the county liable to taxation for state revenue purposes.

In West Virginia, by an order duly authorized by a popular vote, a county subscribes \$250,000 in its bonds to the capital stock of a railroad company, to be expended on that portion of the road located within the county, and appoints three citizens of the county a committee to take charge of the bonds, and deliver the same to the company in such amounts as in their judgment will be at the time a fair compensation to the company for the work then done. The company completes the road through the county, and during its construction all the bonds except \$5,100 are delivered to it; but before the completion of the road the county court makes another order, requiring the bonds still undelivered to be countersigned by the president of the county court, and his concurrence and approval before the bonds are delivered. In response to a demand made by the company upon the committee for the residue of the bonds, they report that they are satisfied the company is entitled to the said bonds, and that they will be delivered upon the signing of their report by the president of the county court, and the latter refuses to sign the report because, in his judgment, the company has not done the amount of work in the county to entitle it to the bonds. The Supreme Court of Appeals deems that mandamus will not lie to compel the president of the county court to countersign and deliver said bonds either to the committee or the company.²

In Iowa the defendant agreed to convey certain land to a railroad, in consideration of its erecting and maintaining a depot on a certain location. In an action for specific performance, defendant objected that there was no mutuality, because the railroad could not be compelled to maintain the depot on the stipulated location. The Supreme Court holds that the objection was not valid, as the railroad could be so compelled. The contract recited that "in consideration of the location and maintenance of a depot within 10 rods of" a certain line, "and the running of trains to and from the same before" a certain date, defendants would convey, etc. The Supreme Court rules that the stipulation as to time referred only to the running of trains, and not to the building of the depot.³

In a Nebraska case it appeared that the C., B. & Q. was a corporation organized under the laws of the state of Illinois and of the state of Iowa, and operating a railroad from the city of Chicago, in Illinois, to a point on the Missouri River in Iowa, opposite the city of Plattsmouth, in that state, and the B. & M. R. in Nebraska was a corporation organized under and by virtue of the laws of that state, operating a railroad from the city of Plattsmouth to Kearney. These two corporations consolidated their stock and franchises into one corporation of joint-stock company, to be known as the "C., B. & Q. R. Co." The Supreme Court decides that by virtue of such consolidation, and the compliance with the laws, the corporation created thereby was not a foreign corporation.⁴

Carriage of Goods and Injuries to Property.

In Iowa the Supreme Court rules that in an action for damages for fire set by a locomotive, the fact that defendant's inspector has testified that so far as he knew, the screen used on the engine alleged to have emitted the sparks was the same as was used on all the engines on the road, does not entitle the plaintiff to show in rebuttal that fires frequently sprung up after the passage of other engines.⁵

In Wisconsin, in an action to recover the value of a span of horses killed upon a railroad track, on the ground that the railroad company had neglected to fence its line of road at the point where the horses got upon the track, defendant contended that the place of the accident was a part of its "depot grounds," and as such not bound to be fenced, under the statute. The evidence showed that there had been at one time a station-house near the point in question, but for several years the company had kept no agent there, the station building had been closed up, and had gone to decay; that there were no grounds for a depot outside of the usual right of way; and that the company had put in cattle-guards 350 ft. south of the station building, and 721 ft. north of it, and beyond these points the road was fenced. The Supreme Court holds, that the Court properly refused to hold, as a question of law, that the "depot grounds" extended from the north to the south cattle-guards, as claimed to have been established by defendant. The extent of such grounds was a question of fact for the jury. Under the evidence, the jury were warranted in finding that the place near the north cattle-guard, where the accident happened, was not a part of the company's depot grounds.⁶

The Supreme Court of Texas holds that a covenant in a deed granting a right of way to a railroad company, stipulating that whenever any portion of the land crossing the

line of the railroad should be inclosed and used for pasture the company should construct a fence on each side of the right of way, is not a covenant that runs with the land, so as to give assignees of the grantor not named in the deed a right of action for a breach thereof.⁷

In Kentucky a railroad company gave notice to a navigation company that it would between certain dates repair its bridge. The season was one in which the river was sometimes obstructed by ice, and the work was done without delay. The Court of Appeals decides that, though the obstruction might have been entirely avoided by an unusual and expensive course, there was no unreasonable obstruction to navigation, and that the harm suffered by the navigation company was not actionable.⁸

In Iowa, in an action for damages, caused by fire escaping from a locomotive, the Supreme Court rules that it was proper to refuse to charge that the fact that a certain road was adopting an alleged improvement "is not such evidence as would show that the defendant is negligent because it has not adopted and placed the same on all its engines;" the Court having already charged that, "when an invention has been tested and generally approved as better than that already in use, it then becomes the duty of defendant, with all reasonable diligence, to adopt and use said invention upon its engines."⁹

The Court of Appeals of Kentucky hold that where a horse is shipped by rail under a contract providing for written notice to the company or its agents, of any claim for injuries, its return by the company's agents, free of charge, to the place of shipment, in consequence of injuries received in unloading, is a waiver of such notice.¹⁰

Injuries to Passengers, Employees and Strangers.

In Iowa a night car-repairer, employed to work on cars while on the tracks, was required to place a draft-iron upon a car, which he directed to be switched on to a side track, where it was stopped at the place indicated by him. His assistant was absent, but plaintiff, knowing of such absence, and of the condition of the road, started to do the work himself, and in attempting to lift the iron to its place slipped on some ice and was injured. There were other employees near who were ready to and did assist him when called. The Supreme Court decides that the railroad company is not liable.¹¹

In Maryland the widow of an employee of the B. & O., after the death of her husband, released any claim she might have against the railroad company for causing his death, for the purpose of enabling her husband's mother to obtain from the B. & O. Relief Association payment of an amount of life insurance, which, under its constitution, was payable only on condition that all persons entitled to sue the railroad company for his death should release the railroad company from liability. The Federal Court, in a suit by the widow against the railroad company, held that the release was not invalid as against public policy.¹²

In Minnesota one M., defendants' yard-master, mounted the switch-engine, and, while acting as engineer, gave deceased directions to assist in uncoupling cars. The latter, while so employed, was run over and killed. The Federal Court holds that the Court properly refused an instruction that, while M. was acting as engineer, he was a fellow-servant of deceased, and defendant would not be liable for his acts as such. Though actually engaged as an engineer, he was not the less yard-master, and entitled to be obeyed in the work of making up trains.¹³

In a Missouri case it appeared that plaintiff was employed by defendant as a section foreman on its road; that a hammer used in his work was furnished him by defendant, having been just repaired at its repair-shop; that it appeared to be in good condition; that in using it in his employment a piece flew off from the face and struck him in the eye; and that the breaking of the hammer was caused by flaws which were not visible before the accident, and which would not have existed had the hammer been properly repaired. The Supreme Court affirms a judgment against the railroad.¹⁴

- ¹ Y. & M. V. R. Co. v. Commissioners, 37 Fed. Rep., 24.
- ² Com. v. L. & N. R. Co., 9 S. W. Rep., 865.
- ³ Satterlee v. Strider, 8 S. E. Rep., 522.
- ⁴ Minn. & St. L. R. Co. v. Cox, 41 N. W. Rep., 24.
- ⁵ State v. C., B. & Q. R. Co., 41 N. W. Rep., 125.
- ⁶ Allard v. C. & N. W. R. Co., 40 N. W. Rep., 685.
- ⁷ McFaragh v. M. & N. R. Co., 40 N. W. Rep., 806.
- ⁸ Gulf, C. & S. F. R. Co. v. Smith, 9 S. W. Rep., 865.
- ⁹ Green & B. R. Nav. Co. v. C. O. & S. W. R. Co., 10 S. W. Rep., 7.
- ¹⁰ Metzger v. C. M. & St. P. R. Co., 41 N. W. Rep., 50.
- ¹¹ Owen v. L. & N. R. Co., 9 S. W. Rep., 841.
- ¹² Way v. C. & N. W. R. Co., 41 N. W. Rep., 51.
- ¹³ Black v. B. & O. R. Co., 36 Fed. Rep., 655.
- ¹⁴ Hardy v. M. & St. L. R. Co., 36 Fed. Rep., 657.
- ¹⁵ Johnston v. Mo. Pac. R. Co., 9 S. W. Rep., 790.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends. Dividends on the capital stocks of railroad companies have been declared as follows:

- Boston & Providence, quarterly 2½ per cent., payable April 1.
- Chartiers, 2½ per cent., payable April 1.
- Cumberland Valley, 2 per cent., payable April 1.
- European & North American, 2½ per cent., payable April 15.
- Georgia Railroad & Banking Co., quarterly, 2½ per cent., payable April 15.
- Long Island, quarterly, 1 per cent., payable May 1.
- New London Northern, quarterly, 1½ per cent., payable April 2.
- Pittsburgh, Fort Wayne & Chicago, quarterly, 1½ per cent., payable April 2; also, special quarterly of 1½ per cent., payable April 1.
- Pittsburgh, Wheeling & Kentucky, 3 per cent., payable April 1.
- Raleigh & Gaston, 3 per cent., payable April 1.
- Sioux City & Pacific, 3½ per cent., on the preferred stock, payable April 5.
- Vermont & Massachusetts, 3 per cent., payable April 8.

Meetings. Meetings of the stockholders of railroad companies will be held as follows:

- Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.
- Cairo, Vincennes & Chicago, special meeting, Cairo, Ill., April 25.
- Chicago, Burlington & Quincy, annual meeting, Chicago, Ill., May 15.
- Cincinnati, Indianapolis, St. Louis & Chicago, special meeting, Indianapolis, Ind., May 15, to consider the agreement for consolidation with the Cleveland, Columbus, Cincinnati & Indianapolis, and the Indianapolis & St. Louis roads.
- Cleveland, Columbus, Cincinnati & Indianapolis, special meeting, Cleveland, Ohio, May 15.
- Lake Shore & Michigan Southern, annual meeting, Cleveland, O., May 1.
- Louisville, Evansville & St. Louis, special meeting, Mt. Vernon, Ill., May 20.

Michigan Central, annual meeting, Detroit, Mich., May 2.
Missouri, Kansas & Texas, annual meeting, Parsons, Kan., May 15.
New York Central & Hudson River, annual meeting, New York City, April 17.
Steinway & Hunter's Point, annual meeting, New York City, April 26.
Toledo, Ann Arbor & North Michigan, annual meeting, Toledo, Ohio, April 17.
Valley (Ohio), annual meeting, Cleveland, Ohio, April 17.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Master Mechanics' Association* will hold its next annual convention at Niagara Falls, beginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The *Master Car-Builders' Association* will hold its next annual convention at Saratoga Springs, N. Y., June 25. Hotel accommodations may be secured by applying to H. S. Clement, Manager Congress Hall.

The *Train Dispatchers' Association* will hold its second annual convention in Indianapolis, Ind., June 12. E. J. Peabody, 237 Franklin street, Chicago, is Secretary.

The *Association of American Railway Accounting Officers* will hold its next meeting at Niagara Falls, N. Y., in July.

The *Traveling Passenger Agents' Association* will hold its next meeting in Plank's Hotel, Mackinac Island, Mich., July 9.

The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept. 10.

The *New England Roadmasters' Association* will hold its next meeting in Boston, August 21.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *National Association of General Baggage Agents* will hold its next meeting at Detroit, Mich., July 17.

The *National Association of Railway Surgeons* holds its annual convention in St. Louis, Mo., May 2, 1889.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, on the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Civil Engineers' Society of St. Paul.

A regular meeting was held April 1. President Loweth in the chair and 12 members present. Mr. Karl Lehman was elected a member. Mr. E. E. Woodman, Secretary of the Chicago, St. Paul, Minneapolis & Omaha Railway, read a paper on "Legislative Control of Railways," which was ordered to be printed in the *Journal of the Association of Engineering Societies*.

Engineers' Club of Kansas City.

A regular meeting was held April 1. President Gunn in the chair; 16 members and 4 visitors present. Mr. R. L. McAlpine was elected an associate member. Mr. Kenneth Allen read a paper on "Pollution, with especial reference to Water Supply and Sewerage." Organic impurities were especially referred to, their detection by chemical and biological analysis; the character and action of bacteria briefly described, and the allowable limits of the impurities mentioned. The paper was discussed by several members, and Dr. F. B. Tiffany showed with a microscope specimens of various organisms. The subject for the meeting of April 15 is, "Notes on Field Inspection of Bridges," by Henry Goldmark; for the meeting of May 6, "Foundations of the Laimfjord Bridge," by Otto F. Sonne.

Engineers' Club of St. Louis.

The 305th meeting was held April 3. President Meier in the chair and 33 members present. Mr. B. F. Crow read a paper on Street Car Running Gear, showing a model and pointing out the improvements made in recent years. The paper was quite generally discussed, and the advantages and disadvantages of anti-friction rollers were pointed out. Mr. W. H. Bryan read a paper on Steam Plants for Electrical Service, which was also discussed. Incidentally, Col. Meier explained that petroleum fuel is not smokeless unless properly handled. In the discussion Professor Gale said that, in his opinion, a large part of the friction in plants using shafting is due to the friction clutches, which might be done away with if the dynamo were located immediately above the shafts, or not far from them.

New England Railroad Club.

On Wednesday evening of this week the April meeting of the New England Railroad Club was held at its rooms in the Boston & Albany station in Boston. A lively discussion was evoked by a paper which was read on "Compound Locomotives." The meeting was well attended; some of the members from the North traveled a long distance in order to be present, thus giving evidence of the widespread interest in the subject of the evening. A full report of the paper and discussion will be given in our next issue.

Western Railway Club.

The Western Railway Club will hold its next meeting on Tuesday, April 16, at 2 p. m., in the Phenix Building, Jackson street, Chicago, opposite the Grand Pacific Hotel. The discussion on axles for 60,000-lb. cars will be continued, and there will also be a discussion on interchange rules.

PERSONAL.

—Mr. W. W. Wells, Superintendent of the Cincinnati Southern, died suddenly, April 3, in his car at Somerset, Ky. He had been slightly ill for a few days.

—Mr. W. S. Hine line has resigned the position of General Agent of the Freight Department of the Chicago, St. Paul & Kansas City, at Chicago, to take effect May 1.

—Mr. Charles W. Pierce, for many years prominently identified with the financial affairs of the Atchison, Topeka & Santa Fe, and for some years its Treasurer, died in Boston, April 5, from apoplexy. He was 71 years old.

—The suit for divorce against Mr. S. H. Church, Superintendent of Transportation of the Pan Handle road, has resulted in a decree founded on the incompatibility of the parties. The serious allegations in the case were disproved.

—Mr. Frank E. Drake, General Western Agent of the Illinois Central and General Southwestern Agent of the Georgia associated traffic lines, died at his residence in Kansas City last week. He was about 40 years old, and has held the position about six years.

—Mr. H. M. Perry, for some time past the Superintendent of the Pullman Car Works at Chicago, has resigned the position, to take effect April 15. Mr. Perry goes to Knoxville, Tenn., to assume the management of the Southern Car Works.

—Mr. A. J. McDowell, of Boston, General Auditor of the Mexican Central, was taken with a congestive chill last Wednesday morning en route from the City of Mexico, and was compelled to stop over at Albuquerque. He died in that city five days later, April 8.

—Mr. Daniel Ulrich, who for several years has been Civil Engineer on the Buffalo & Niagara Falls branch of the New York, Lake Erie & Western, has resigned, and will engage in civil engineering with Mr. George Reiker, with office in the White Building, Buffalo, N. Y.

—Mr. S. Y. McNair has been elected Treasurer and Auditor of the Inter-state Commerce Railway Association. Mr. McNair has been for some years chief clerk in the office of the Comptroller of the Erie, and is a man of high attainments as an accountant and statistician.

—A lecture on the Compound Locomotive and Recent Progress in Freight Car Construction was delivered before the graduating class in the Locomotive Engineering Department of the Massachusetts Institute of Technology, on Wednesday last, by Mr. D. L. Barnes.

—Mr. George D. Lawrence, recently Superintendent of the Chattanooga, Rome & Columbus, who has been appointed General Agent at Memphis of the East Tennessee, Virginia & Georgia, was last week the recipient of a beautiful silver dining set, a gift from the employees of the former road.

—Ex Senator Sabin, of Minnesota, has been chosen President of the Caracas & La Guayra Railroad Co., which has secured valuable concessions from the Venezuelan Government. Senator Sabin will probably shortly make a personal visit to Venezuela in relation to the enterprise.

—Mr. James Callery, President of the Pittsburgh & Western Railroad Co., died suddenly early Friday morning, April 5, from a stroke of paralysis. He was 56 years old. Mr. Callery was identified with many corporations in Western Pennsylvania, and was President of the Pittsburgh Junction and other railroad companies.

—Mr. R. E. Andrews, late Chief Engineer of the Port Townsend & Southern Railroad, is now in charge of the Port Townsend & Quilcene Water Works, a line 22 miles long, 16 miles of pipe and 6 of open trenches. It will be a gravity system, and will supply not only Port Townsend but Port Discovery. The system when completed will cost about \$750,000.

—Mr. Robert Andrews, who has just been elected Vice-President of the Safety Car Heating & Lighting Co., with office at 160 Broadway, New York, has been in railroad service for the past 35 years. He is best known from his long service with the Wabash system, at different times Chief Engineer, General Superintendent, and Consulting Engineer. Men rarely bring to a new office more ample qualifications of technical education and experience.

—Mr. John Sebastian, General Ticket and Passenger Agent of the Chicago, Kansas & Nebraska, has had his authority extended over the main line and branches of the Chicago, Rock Island & Pacific, succeeding E. A. Holbrook, who resigned last November. Mr. Sebastian was born in 1849, and became connected with the Chicago, Rock Island & Pacific in 1880 as General Southwestern Passenger Agent, which position he held until April 1, 1887, when he became General Passenger and Ticket Agent of the Chicago, Kansas & Nebraska. Mr. Sebastian was in the service of the Atchison, Topeka & Santa Fe, from 1869 to 1880.

ELECTIONS AND APPOINTMENTS.

Allegheny Valley.—The annual meeting of the company was held in Pittsburgh, April 9, and the following board of managers elected: Henry D. Welsh, George B. Roberts, Joseph N. DuBarry, John P. Green, A. J. Cassatt, N. P. Shortridge, Edmund Smith, Charles E. Spier and B. H. Rubie.

Alton Terminal.—The incorporators of this Illinois company are: Delos R. Haynes and H. A. Fisher, of St. Louis; P. A. Garlott and W. S. Hoke, of Springfield, and F. E. Fisher, of Jerseyville, Ill.

Atchison, Topeka & Santa Fe.—R. Z. McCoy has been appointed Roadmaster on the main line, Osage City to Emporia Junction, Osage City to Queenemo, and from Emporia to Moline over the Howard Branch, with headquarters at Emporia, Kan., vice John Feeney, resigned.

Atlantic & Pacific.—A. A. Gaddis having resigned, the office of General Superintendent has been abolished. Andrew Smith has been appointed Superintendent of Transportation, with office at Albuquerque.

Bald Eagle Valley.—The following directors were elected this week: President, J. N. DuBarry; A. G. Curtin, Wm. L. Ekins, John P. Green, John Irwin, Jr., C. A. Mayer, Wistar Morris, Wm. A. Patton, Oliver H. Reighard, Daniel Rhoads, G. B. Roberts, N. Parker Shortridge and Henry D. Welsh.

Bellefonte, Kittany & Lamont.—The following directors were elected at the annual meeting held this week: President, J. N. DuBarry; John P. Green, C. A. Mayer, Wm. A. Patton, G. B. Roberts, N. Parker Shortridge and Henry D. Welsh.

Bluefield & Hinton.—The incorporators of this West Virginia company are: A. W. Reynolds, of Bluefield, W. Va.; C. H. Duhring, Jr., of Coopers, W. Va., and J. A. Walch, of Bramwell, W. Va. The principal offices will be at Bluefield.

Buffalo, Rochester & Pittsburgh.—C. M. Cook has been appointed Engineer of Maintenance of Way.

Central Pacific.—The stockholders of the road re-elected all the former directors of the company this week, as follows: Leland Stanford, C. P. Huntington, Charles F. Crocker, A. N. Towne, Timothy Hopkins, E. H. Miller, Jr., and C. E. Bretherton.

Chicago & Grand Trunk.—The annual meeting was held in Chicago, April 10, and the following directors and officers were elected: Directors, J. H. Hickson, L. J. Saargent, E. W. Middaugh, DeF. Skinner, W. C. Beardsley, F. A. Howe and Henry Howard. At a subsequent meeting of the board of directors, J. H. Hickson was re-elected President, L. J. Saargent Vice-President and W. J. Spicer General Manager.

Chicago, Rock Island & Pacific.—The Chicago, Kansas & Nebraska having been consolidated with this company, the jurisdiction of General Manager E. St. John has been extended to the Indian Territory and Colorado Springs. H. H. Parker, General Manager of the Chicago, Kansas & Nebraska, has been appointed Assistant to the President, in charge of construction. President Cable announces the appointment of Thomas E. Withrow, who has been General Solicitor, as the General Counsel of the consolidated companies.

John Sebastian has been appointed General Ticket and Passenger Agent of the lines east and west of the Missouri River, with headquarters at Chicago.

Thomas S. Wright, Division Solicitor in Iowa, has been appointed General Attorney for that portion of the line north of the state of Missouri and east of the Missouri River. M. A. Low, Division Solicitor for the Missouri Division and General Solicitor for the Chicago, Kansas & Nebraska, has been appointed General Attorney for the lines in the state of Missouri and west of the Missouri River. Mr. Wright will have his office with the General Counsel in Chicago. Mr. Low's office will be at Topeka, Kan.

Chicago, St. Paul & Kansas City.—George W. Andrews, formerly Local Ticket and Passenger Agent of the Chicago & Eastern Illinois at Chicago, has been appointed Southern Passenger Agent, with office at Cincinnati, O. His territory will embrace the states of Ohio, Indiana, and Illinois, and the cities of St. Louis, Mo., and Louisville, Ky.

Cincinnati, Alabama & Atlantic.—The following officers have been chosen: President, M. R. Campbell, Tallahassee, Tenn.; Vice-President, H. K. Bryson, Fayetteville, Tenn.; Secretary, B. P. Hunt, Huntsville, Ala.; Treasurer, G. R. Crane, Tallahassee, Tenn. Executive Committee: M. R. Campbell, W. D. L. Record, W. Richardson, General Attorney for the company, James A. Jones, of Woodbury, Chief Engineer, O. H. P. Cornell, of New York.

Cincinnati, Indianapolis, St. Louis & Chicago.—A. J. Diddle has been appointed Roadmaster, in charge of the division between Cincinnati and Indianapolis.

Cincinnati, Wabash & Michigan.—The annual meeting of the stockholders of the road was held in Indianapolis, April 10, resulting in the election of the following officers for the next year: President, J. H. Wade, Cleveland; Secretary and Treasurer, W. S. Jones, Cleveland; General Manager, Norman Beckley, Elkhart, Ind.

Colorado Midland.—The following directors were elected at the annual meeting of the stockholders held April 1: C. W. Benson, Joseph R. Busk, Thomas E. Jevons, Samuel S. Sands, William D. Sloane, Frederick F. Thompson, George Coppel and George Mosle of New York; Theodore M. Davis, Newport, R. I.; James J. Hagerman and John Scott, Colorado Springs, Col.

Coudersport, Hornellsville & Lackawanna.—Benton McConnell has been elected President; Charles Adsit, Treasurer, and J. W. Near, Secretary, all of Hornellsville, N. Y.

Denver, Memphis & Atlantic.—The annual meeting of the stockholders was held April 3, and the following board of directors was elected: George J. Gould, E. C. Merriam, A. H. Calef, Russell Harding, J. H. Richards, C. M. Turner, W. C. Robinson, George C. Smith and W. Speer. The directors elected officers as follows: Geo. J. Gould, President; J. H. Richards, Vice-President; Geo. C. Smith, Secretary; A. H. Calef, Treasurer; G. S. Mansur, Assistant Secretary and Treasurer.

East Branch Connecting.—The directors of this New York company are: William H. Starr, William M. Corbett, George W. Dowe, Lewis E. Carr, Louis M. Toulon, James H. Lounsbury, William L. Derr, James H. Glazier, William J. Van Wormer, Frank Hardenburg, Joseph H. Moore, George W. Heidenthal, Port Jervis, Orange County, N. Y., and Alva I. Lord, Lordville, Delaware County, N. Y.

Elk Creek.—L. E. White, I. H. Tate, Chas. E. Wilson, E. J. Dodge and T. Pollard are incorporators of this California company.

Evansville & Terre Haute.—The duties of T. A. Allen, Chief Engineer of the Peoria, Decatur & Evansville division of this system, have been extended over the Evansville & Indianapolis, Evansville & Terre Haute and Evansville Belt roads, with headquarters at Evansville. The title of C. C. Robinson, now General Foreman Peoria, Decatur & Evansville, has been changed to Master Mechanic.

Galveston, Houston & Henderson.—The stockholders and directors of the company met in Galveston last week and elected the following officers: Col. George A. Eddy, President; Hon. S. H. H. Clark, Vice-President; Major B. P. McDonald, Treasurer; H. B. Hinson, Assistant Treasurer; R. B. Hawley, Secretary.

Georgia, Carolina & Northern.—The stockholders, at a meeting held last week, elected the following officers and directors: President, R. F. Hoke, of North Carolina; Secretary and Treasurer, A. L. Hull, of Athens; Board of Directors, R. C. Hoffman, J. M. Robinson, W. G. Childs and Louis McLain, Baltimore; C. A. Walker, Greenwood, S. C.; T. E. McLure Chester, Columbia, S. C.; L. W. Perrin, Abbeville, S. C.; C. A. Collier, R. J. Lowry and Hoke Smith, of Atlanta, and A. H. Hodgson, of Athens, Ga.

Grand Southern.—The following directors were chosen last week: Russell Sage, Giles E. Pantor, Richard J. Cross, Sidney Shepherd, all of New York; Frank Todd, of St. Stephen, N. B.; H. McLean, of St. John, N. B.

Jacksonville, Tampa & Key West.—John H. Bland has been appointed Florida Purchasing Agent, with headquarters at Jacksonville.

Kansas City Circuit.—The following are the incorporators of this Kansas road: A. P. Fonda, J. Jay Spencer and G. S. McLaughlin, Kansas City, Mo.; Nicholas McAlpine, E. S. W. Prough and J. V. Nelson, of Kansas City, Kan., and Vernon C. Jarboe, of Paola, Kan.

Kansas City & Quindaro.—The incorporators of this Kansas company are: E. L. Martin, L. R. Moore, G. W. McClelland and S. P. Keller, of Kansas City, Mo.; L. H. Wood, W. L. Wood, and V. J. Lane, of Kansas City, Kan.

Kansas & St. Joseph Air Line.—The incorporators of this new Missouri company are: William P. VanAken, William Stewart, R. M. Stewart, H. A. Keefer, E. L. Furnish and W. H. Reed.

Keeseeville, Ausable Chasm & Lake Champlain.—The incorporators of this New York company are as follows: Charles F. Tabor, Rufus Prescott, James R. Romeyn, Geo. N. Kingland, Conant S. Taylor, Richard Hoag, Charles M. Hopkins, Herman H. Forrence, Edmund K. Baber, Adelbert W. Boynton, Keeseeville, N. Y.; Thomas S. Coolidge, Glens Falls, N. Y.; William M. Mooney, Ausable Chasm, N. Y.; Lewis S. Crandall, Troy, N. Y.

Kinzua Valley.—The following are the directors of this Pennsylvania company, whose incorporation was noted last week: J. C. French, S. S. Bullis, Olean, N. Y.; H. P. Weaver, Kane, Pa.; C. D. Williams, Bradford, Pa.; C. A. Bacher, Smethport, Pa.; Peter McNeil, Buffalo, N. Y., and George L. Roberts, Bradford, Pa. S. S. Bullis is President.

Lake Shore & Michigan Southern.—James E. Childs has been appointed Assistant General Manager, with headquarters at Cleveland, O., in place of J. T. Harahan, resigned.

Lockport & Northern.—This company, whose incorporation was noted last week, has elected the following officers and directors: President, William Spalding; Vice-President, Willard T. Ransom; Treasurer, John Hodge; Secretary, Charles A. Hoag; Attorney, Edwin L. Jeffery, all of Lockport. Board of Directors: E. M. Ashley, Charles T. Hoag, William Spalding, John Hodge, Edwin L. Jeffery, Willard P. Ransom and Frank P. Weaver.

Long Island.—The annual meeting of the stockholders of the company was held April 9, in Long Island City. The following were elected directors: Austin Corbin, J. Rogers Maxwell, Henry Graves, Henry W. Maxwell, James G. K. Duer, Edward Tuck, Frederick W. Duntun, William G. Wheeler, William B. Kendall, Alfred Sully, John P. Townsend, James D. Campbell and Daniel Lord, who was elected in the place of Demas Barnes, deceased. Over 160,000 shares of stock were represented at the election.

P. D. Ford has been appointed General Roadmaster, with headquarters at Long Island City, N. Y., in place of G. W. Offutt, who has resigned. The Chief Engineer of the road will continue to have charge of the bridges as heretofore; but the General Roadmaster will be expected to look after the bridges in connection with his other duties and report in relation to them to the Chief Engineer.

Los Angeles, Glendale & Pasadena.—The incorporators of this California company are: John Cross, Albert P. Cross, G. W. Morgan, Nathan Cole, Jr., of Los Angeles; Richard Kerens, Byron F. Hobart and Lewis C. Nelson, of St. Louis.

Louisville Southern.—The office of General Freight Agent having been abolished, A. V. Lafayette has been appointed Division Agent in charge of freight traffic. He will also assume the duties pertaining to the office of General Agent at Louisville, of the Louisville, New Albany & Chicago, vice C. F. Martin, transferred.

Missouri River, North Platte & Denver.—The incorporators of this Nebraska company are: Logan Clarke, T. C. Patterson, S. B. Thompson, A. M. Robbins, William F. Cody, E. H. Hill, Peter Mortenson, Thomas Fox and S. S. Hadley.

Mobile & Ohio.—At a meeting of the board of directors, held in New York, April 3, the following officers were chosen: J. C. Clarke, President and General Manager, Mobile, Ala.; W. Butler Duncan, Chairman of Board, New York; J. H. Fay, Vice-President, New York; Henry Tacon, Secretary and Treasurer, Mobile; R. V. Taylor, General Auditor, Mobile; E. L. Russell, General Solicitor, Mobile; A. McIntosh, Assistant Secretary, New York.

New York, Lake Erie & Western.—F. L. Pomeroy has been appointed General Eastern Freight Agent, in charge of westbound traffic, vice T. L. Hanna, resigned, with headquarters at 401 Broadway, New York.

Orange Belt.—The following officers have been elected: E. T. Stablesby, of Philadelphia, President; Thomas E. Wilson, Sullivan Lake, Vice-President; William Macleod, of Oakland, Fla., Secretary and Treasurer.

Peru & Detroit.—The following are the directors of this new Indiana company, whose incorporation was noted last week: Richard F. Donaldson, Carter B. Higgins, L. B. Fulwiler, George H. Geves, Richard A. Edwards, W. C. Raymond and Charles H. Brownell.

Redondo.—The following compose the first board of directors of this California company: George J. Ainsworth, S. O. Brown, W. H. Bonsall, L. T. Garney and D. McFarland.

Reed Springs & Kansas City.—Incorporated in Missouri by G. J. Reed, of Kansas City; J. D. Swan, of Reed Springs; Samuel Hardwicke, of Liberty; M. N. Ewing, Geo. F. Swan, J. A. Hayes, and M. C. Nixon, of Kansas City.

Rochester, Beaver Falls & Western.—The first board of directors of this Pennsylvania company, whose incorporation was noted in our issue of March 29, is as follows: John Reeves, Beaver Falls, Pa., President; John M. Buchanan, Beaver, Pa.; Robert S. Kennedy and Edward L. Dawes, New Brighton, Pa.; James F. Merriman, Harry W. Reeves, John T. Reeves, James M. May and George W. Coates, all of Beaver Falls, Pa.

San Gabriel Valley Rapid Transit.—The following are named as directors in the amended articles of incorporation: E. F. Spence, John Bryson, Sr., F. Q. Story, J. De Barth Shorb, George H. Bonebrake, H. A. Unruh, F. C. Howes, W. C. Kerckhoff and W. N. Monroe. E. F. Spence is President.

Sault Ste. Marie & Southwestern.—The incorporators of this company in Wisconsin are: N. C. Foster, G. A. Foster and E. J. Foster, of Fairchild; S. M. McCaslin and James McIntire, of Eau Claire, Wis.; R. M. Torsman, of Williamsport, Pa.; Charles I. Wickersham, of Chicago, Ill., and C. H. Shores, of Osseo, Wis. N. C. Foster is President and C. M. Wilson is Secretary.

Shreveport & Texarkana.—This company has elected the following officers: R. J. Cyle, President; John R. Jones, Vice-President; T. Short, Secretary and Treasurer.

Southern Pacific.—The directors elected general officers last week at San Francisco. The only change is that C. F. Crocker takes the place of his father as Second Vice-President and A. N. Towne becomes Third Vice-President.

James Detrick has been appointed Acting Division Superintendent of the Visalia and Tulare divisions, to fill the vacancy occasioned by the death of G. W. Coddington.

Spokane, Post Falls & Eastern.—The following officers have been elected: F. Post, President; W. A. Cannon, Vice-President; George A. Manning, Secretary, and W. D. Palmer, Treasurer.

Syracuse, Ontario & New York.—G. W. Clymans has been appointed General Baggage Agent, with office at Weehawken, N. J.

Zanesville & Ohio River.—E. C. Winstanley, Traffic Manager, has been appointed General Manager. The latter office has heretofore been filled by the President. The office of Traffic Manager has been abolished.

Western & Atlantic.—The announcement in our issue of March 29, of the appointment of E. C. Spalding, Car Accountant of this road, as Car Accountant of the Alabama Midland, left the impression that Mr. Spalding had resigned his position on this road. Such is not the fact. Mr. Spalding is simply acting as Car Accountant of the Alabama Midland until that road, now under construction, is completed.

Wilmington & Seacoast.—J. B. Nolan, Assistant Superintendent of Transportation on the Wilmington & Weldon, has been chosen General Manager of this road to succeed James H. Chadbourne, Jr., resigned. His office will be at Wilmington, N. C.

OLD AND NEW ROADS.

New Companies Organized.—Cambria & Alexandria.—East Branch Connecting.—Elk Creek.—Kansas City, Rich Hill & Eldorado.—Kansas City & St. Joseph Air Line.—Keeseeville, Ausable, Chasm & Lake Champlain.—Los Angeles, Pasadena & Glendale.—Redondo.—San Diego & Northeastern.—Spokane, Post Falls & Eastern.

Alabama Midland.—The company having agreed to extend its road to Tuscaloosa, Ala., if a subsidy of \$90,000 was given it, meetings of the residents of the city were held, and \$60,000 was soon raised, and it is expected to obtain the remaining \$30,000 to complete the amount required, in a few days.

Allegheny Valley.—Judge Arnold, as arbitrator, has decided the claim of the Pennsylvania against the Philadelphia & Erie for \$650,000, and against the Northern Central for the same amount on account of the joint guaranty of Allegheny Valley bonds, in favor of the defendants and against the plaintiffs. There will be no appeal from this ruling.

Alton Terminal.—Charter filed in Illinois to build a road from a point on the Mississippi River, in Madison County, to Alton and Venice, a distance of about 20 miles.

American Midland.—The company has filed articles of consolidation of the New York, Mahoning & Western and the Ohio, Indiana & Missouri River. The capital stock of the consolidated company is \$5,000,000, of which \$3,000,000 is to be held by the stockholders of the New York, Mahoning & Western and the other \$2,000,000 by the Ohio, Indiana & Missouri River.

Birmingham, Jackson & Kansas City.—A survey is to be made at once from Jackson, Tenn., northwest to a point on the Mississippi River, at or near Tiptonville. Clifton Dancy, of Jackson, is President.

Birmingham Mineral.—J. W. Worthington & Co., of Birmingham, who have the contract for the entire work on the Red Gap extension, have let nine miles; Reed, Fortenberry & Co., two miles; Carpenter Bros., one mile; M. McTighe & Co., two miles; Sims Bros., two miles, and Adams & Minger, one and one quarter of a mile, leaving one mile unlet.

Bluefield & Hinton.—This company has been chartered in West Virginia to build a road from a point near Bluefield northeast to Hinton, about 30 miles.

Camden & Alexandria.—Articles of incorporation have been filed in Arkansas by this company to build a road from Camden south to the Louisiana line, a distance of 200 miles, opening up a country rich in agricultural products and pine timber. The capital stock is \$450,000.

Canadian Pacific.—During the discussion in the Canadian House of Commons on the bill to give this company increased powers and to allow it to consolidate its debt, Sir John Macdonald announced that the Government had entered into an arrangement with the company for the construction of a line between Harvey and Salisbury, N. B., with all convenient speed.

Cape Fear & Yadkin Valley.—Grading on the 81-mile extension from Fayetteville to Wilmington, N. C., is now finished for 61 miles. Of this 34 miles is completed from Fayetteville and 27 miles from Wilmington. Work is in progress on the bridges. It is expected that tracklaying will begin at Wilmington early in May and at Fayetteville in August, when it is expected to have the bridge at that point completed. The line will probably be placed in operation by Jan. 1 next.

Central (New Brunswick).—The contract will be let immediately for ballasting and tracklaying on that portion of the road from Norton Station, on the Intercolonial, to Chipman, at the head of Grand Lake, a distance of 44 miles. Thomas M. Williamson, of Chipman, Queen's County, N. B., is Chief Engineer.

Chicago, Kansas & Nebraska.—A general order has been issued by President Cable announcing that the Chicago, Rock Island & Pacific assumes the operation of Chicago, Kansas & Nebraska in Kansas, Nebraska, Colorado and the Indian Territory as a part of its own line. Heretofore the line, while virtually a part of the Rock Island system, was under separate management.

Chicago, Rock Island & Pacific.—The company has perfected arrangements by which its passenger-train service will be extended on April 22 from Caldwell, Kan., to Pond Creek, I. T., the present terminus of the line, where connection will be made with stages running by daylight to King Fisher, at which point the new government land office is to be located, and also to Fort Reno. By this action the Rock Island expects to secure a large share of the Oklahoma traffic.

Chicago, St. Paul & Kansas City.—The company is filing copies of a mortgage made to secure a new 100-year four per cent. bond. It is proposed to issue \$30,000,000 new four per cent. 100-year bonds to take up all the higher rate bonds of the Minnesota & Northwestern and the Chicago, St. Paul & Kansas City roads, and to make improvements on the property.

Cincinnati, Alabama & Atlantic.—The locating survey was begun at Tullahoma, Tenn., last week, and the

surveyors will work toward Huntsville, Ala., to meet the party surveying from that point. It is expected to begin work on this section of the road, 64 miles long, within the next 30 days and complete it by March 1 next. The second section, from Tullahoma to Auburn, will, it is claimed, be ready for operation by June 1, 1890. The entire line to Somerset, Ky., is under contract. The line of the road passes along, or near, the western slope of the Cumberland Mountains, reaching some of the best coal, steel ore, coal oil, natural gas, lithograph stone, lead, silver ore, hard wood and yellow poplar lands to be found in the United States. Nearly one-half the line is through a well populated agricultural country. M. R. Campbell, of Tullahoma, Tenn., is President.

Dallas, Pacific & Southeastern.—Fifteen miles of this line has now been graded, and 20 more is ready for grading. The locating survey has been nearly completed for 75 miles from Dallas, Tex., northwest to Albuquerque, N. M., where the line will connect with the Atlantic & Pacific. The company has enough funds in hand to build the first 100 miles, and expects to construct the rest of the line by bonding the first 100 miles. Burkitt & Murphy, of Palestine, and Burns & Peters, of Dallas, have the contract for 100 miles, and as soon as this is graded tracklaying will commence. J. E. Henderson, of Dallas, is President, and M. H. McLaurin is Vice-President.

Delaware River & Lancaster.—It is stated that contracts will be soon let for building that portion of the proposed road between Phoenixville, Pa., and the Falls of French Creek as quickly as possible. This portion of the road will be finished in November. The object is to connect the Falls of French Creek with Phoenixville.

East Branch Connecting.—Incorporated in New York with a capital stock of \$50,000 to build a road commencing at the main line of the New York, Lake Erie & Western, in the town of Hancock, Delaware County, and running thence northerly through the county of Delaware to a connection with the New York, Ontario & Western at some point near the station known as Hancock on that road.

Elk Creek.—Articles of incorporation of the company have been filed in California to construct a railroad from a point near the mouth of Greenwood Creek, Mendocino County, to Elk Creek, a distance of 20 miles. There will also be a branch line down the right bank of Aider Creek, a distance of 8 miles. The capital stock is placed at \$500,000.

Evansville Terminal.—This company, which is building the extension of the Ohio Valley from Henderson, Ky., to Evansville, Ind., has been consolidated with the Ohio Valley. The extension will be placed in operation within a few days and work will then be begun on the extension from Princeton to Hopkinsville.

Fairchild & Mississippi River.—The Sault Ste. Marie & Southwestern road has filed a charter in Minnesota under the above name. The proposed line starts from a point at or near Fairchild, Wis., runs through the counties in Wisconsin of Eau Claire, Clark, Jackson, Trempealeau, Marathon and Buffalo to a point on the line of the Chicago, Burlington & Northern, with a branch road running from Fairchild to some point on the Wisconsin Central in the county of Marathon or Clark. The length of the road and branches is to be about 100 miles.

Georgia Southern & Florida.—About 800 laborers are at work on the extension from Valdosta, Ga., south to Lake City, Fla., 60 miles, and 15 miles will be graded early next month, about eight miles being ready for the track now.

Gettysburg & Harrisburg.—A survey was commenced this week for a proposed branch from its present terminus at Round Top, Pa., near Gettysburg, to Washington, D. C. A. E. Lehman is Chief Engineer.

Hoosac Tunnel & Wilmington.—The owners of this narrow gauge road, extending from the Fitchburg road at the east end of the Hoosac Tunnel northward to Readsboro, Vt., 11 miles, have offered to extend the line northward through Whitingham and within a mile of Jacksonville and Sadawga to Wilmington, provided Wilmington will contribute \$35,000 and Whitingham \$25,000. The distance is about 14 miles, and the cost is estimated at \$8,000 a mile. The town of Wilmington is understood to be in favor of granting the aid desired.

Houston & Texas Central.—In the United States Court for the Eastern District of Texas a bill of complaint has been filed by the Farmers' Loan & Trust Co., of New York, against the Houston & Texas Central for the foreclosure of the Waco & Northwestern Division first-mortgage bonds. Upon this pleading an order has been made appointing Charles Dillingham, already Receiver of the Houston & Texas Central in the suit of the Southern Development Co., as a separate Receiver of the Waco & Northwestern Division.

Kansas City Circuit.—This company has been chartered in Kansas to build a standard gauge road from Quindaro to the mouth of the Kaw River at Kansas City, Kan., thence north and west, and back to Quindaro. The line will be about 15 miles long. The capital stock of the company is \$500,000.

Kansas City, Oklahoma & Arkansas.—This company, recently chartered in Kansas, has applied for a franchise to build its road through Kansas City, Kan., from the foot of Everett street south along the Missouri River to its confluence with the Kaw; thence following the west bank of the Kaw to the southwestern limits of the city at a point opposite Argentine. It is proposed to construct a railroad bridge across the Missouri River at Everett street, where the proposed route of the line in the city begins.

Kansas City & Quindaro.—Charter filed in Kansas to build a road from a point in Johnson or in Wyandotte County at the state line, to Quindaro, and thence to the confluence of the Kaw and Missouri Rivers, an estimated length of 20 miles.

Kansas City, Rich Hill & Eldorado.—This company has been incorporated in Ohio to build a road from the town of West Eldorado, in Cedar County, Mo., thence through the counties of Cedar, Vernon and Bates to Rich Hill, a distance of 30 miles. The capital stock is \$450,000.

Kansas City & St. Joseph Air Line.—The company has been organized in Missouri, with a capital stock of \$500,000, to construct a standard gauge road from Kansas City to St. Joseph, through the counties of Jackson, Clay, Platte and Buchanan. The length of the proposed road is 50 miles.

Kansas, Watkins & Gulf.—The company expects to let contracts in May or June for building the first section of its road, which has now been surveyed from Lake Charles, La., on the Galveston, Harrisburg & San Antonio, north to Shreveport, La., a distance of 180 miles. J. B. Watkins, of Lawrence, Kan., is President, and P. H. Philbrick, of Lake Charles, is Chief Engineer.

Keeseville, Ausable Chasm & Lake Champlain.—Incorporated in New York, with a capital stock of \$80,000, to construct a road commencing at Port Kent, in the town of Chesterfield, Essex County, New York, through Ausable, Clinton County, to the village of Keeseville, a distance of six miles.

Kingston & Polo.—It is expected to let contracts in September for building this Missouri road, which is to extend from Kingston to Polo, seven miles. The line has been surveyed and the work will be light. C. N. M. Love, of Kingston, is President, and Johnson Boyd is Chief Engineer.

Lincoln Park & Charlotte.—Ryan & McDonald, of Baltimore, have been awarded the contract for grading this road from Lincoln Park to Charlotte, N. Y.

Long Island.—The certificate of surrender of the capital stock of the Long Island City & Flushing Railroad Co. to the Long Island Railroad Co. was filed in the office of the Secretary of State at Albany last week.

Los Angeles, Glendale & Pasadena.—Articles of incorporation of the Los Angeles, Pasadena & Glendale road have been filed in California. The company is to purchase and operate all the franchises of the road now owned by the Los Angeles & Glendale road. The company proposes to build a railroad to run from within the city limits of Los Angeles to within the city limits of Pasadena, its length to be nine miles; also, to build a branch, an extension of the present Los Angeles & Glendale Railroad, to Verdugo Park, a distance of nine miles.

Lynchburg Belt.—Two routes have been surveyed by this company for a belt road at Lynchburg, Va., to be about three miles long. It has not yet been decided which line will be adopted, except for a short distance, and contracts will not be let for some time. Peter J. Otey is President and R. Taylor Gleanes is Consulting Engineer, both with office at Lynchburg.

Macon & Birmingham.—The survey for this road is to begin April 15 at Macon, Ga., and will be continued thence to Birmingham, Ala., about 220 miles. The road will be built by the Macon Construction Co., of Macon, Ga., and the projectors propose to use stone culverts, iron bridges and 75 or 80 lb. steel rails. The maximum grade will be 50 ft., and the route is through a fine agricultural and mineral section. F. S. Johnson, of Macon, is President.

Mississippi & Tennessee.—The stockholders have approved the consolidation with the Chicago, St. Louis & New Orleans and the lease of the road to the Illinois Central, and it will continue to be operated by that company as its Memphis division. Minority stockholders endeavored to secure an injunction to prevent this action, but the court refused to grant it. The road extends from Memphis southeast to Grenada, Miss., 100 miles.

Missouri River, North Platte & Denver.—Charter filed in Nebraska with a capital stock of \$500,000 to build a road from a point on the Missouri River, in Butte County, westerly through Cumming, Madison, Boone, Platte, Grundy, Valley, Custer, Lincoln, Logan, Keith, Perkins, Arthur, Deuel, Cheyenne, Scott, Bluff, and Banner to the west line of the state. The principal office will be at Albion, Boone County.

New York, Providence & Boston.—The Railroad Committee of the Massachusetts Legislature this week voted to report a bill authorizing the lease of the Providence & Worcester to the New York, Providence & Boston road.

Norfolk & Western.—In the annual report the new construction work is spoken of as follows: Surveys for a line to connect the present terminus of the New River Division with the Ohio River and the railroad systems beyond were continued throughout the year, and are now practically completed, the line having been located to Ironton, O. This line, 190 miles in length, extends for nearly its entire length through a territory containing steam, coking, gas and canal coals, and heavily timbered, and from its local resources alone will undoubtedly furnish sufficient traffic to justify the construction of the line; and in addition, this line will add largely to the through business of the company and afford new and desirable markets for the products of the industrial establishments upon the line. The President also states that surveys have been made for the further development of the iron ore territory between the Cripple Creek extension and the Cape Fear & Yadkin Valley Railroad. The distance between the present termini of the two lines is about 45 miles, and that portion of the connecting link to be built by the company 35 miles in length, will develop the resources of a section of country containing iron, zinc and copper ores, and furnish considerable local traffic. The net income for the year amounted to \$748,558 67, equivalent to 3 1/2 per cent. upon the preferred shares. There is no floating debt.

Northern Pacific.—The company has built an extension this year from Laurel Junction, Mont., on the main line southwest up Rocky Fork River and through the Crow Indian Reservation to Red Lodge, a distance of 43.9 miles.

Philadelphia & Reading.—Real estate in Philadelphia and other places through which the road passes, estimated to be worth several millions of dollars, and which cannot be used for railroad or storage purposes by the company to which it belongs, is to be offered for sale by the company. It was acquired during the administration of ex-President Gowen. Included in the list of properties offered are four-story brownstone office buildings on Walnut street; the Montgomery Hotel property, and a number of two and three story dwellings in Philadelphia; several wharves with ground adjoining; 13 acres on Windmill Island; nine unimproved properties; several rolling mill properties in Reading and Hamburg; the old Maryland canal and water power; stone quarries at Port Deposit; the Mansion House, at Mt. Carbon; 2,948 acres of timber in West Brunswick, Blythe and North Mannheim townships, and farms of various sizes in Montgomery, Bucks and Schuylkill counties.

Redondo.—This company has filed a charter in California to build a narrow-gauge road in southern California from Los Angeles to Redondo Beach, a distance of 20 miles.

Reed Springs & Kansas City.—The company is organized for the purpose of constructing and operating a standard gauge railroad between Liberty and Reed Springs, a distance of four miles. The capital stock is \$40,000.

Richmond & Danville.—The Northwestern North Carolina Road has been opened for business between Winston and Rural Hall, 13 miles, connecting at Rural Hall with the Cape Fear & Yadkin Valley road. A regular station has been established at Rural Hall, 41 miles west of Greensboro, N. C. This line is being built west to Wilkesborough, N. C., 70 miles from Winston.

Rochester & Glen Haven.—Track laying was commenced April 8 on the section from Glen Haven to Irondequoit Bay, 1 1/2 miles, and the work will be completed by May 10. The section from Rochester to Glen Haven, N. Y., 8 1/2 miles, has been completed some time. E. W. Huntington, 65 Reynolds Arcade, Rochester, N. Y., is the contractor, and William C. Gray, is Chief Engineer.

San Diego & Northeastern.—Incorporated in California by A. R. Thomas, A. G. Gassen and others, with a capital stock of \$1,000,000, to build a road from San Diego northeast to Escordido. Sixteen miles of the road is already in operation under a different name.

San Gabriel Valley Rapid Transit.—The company has filed amended articles of incorporation in California. The object is to operate a railroad from Los Angeles via Ramona and Monrovia to San Bernardino, a distance of 60 miles, also from West Alhambra via Pasadena to the summit of the Sierra Madre Mountains, 12 miles. The capital stock is \$250,000, all subscribed.

Scranton & Forest City.—The litigation growing out of the efforts of the Delaware & Hudson Canal Co. to restrain the Scranton & Forest City from obtaining right of way through the canal company's land at Carbondale, Pa., has been ended by the Lackawanna County Court permitting this company to file a bond for the payment of whatever damages may be caused in running the new railroad through the canal company's property.

Spokane, Post Falls & Eastern.—This company has been incorporated in Washington Territory to build a line from Spokane Falls to Post Falls, Idaho, and to the Coeur d'Alene and Pen d'Oreille lakes, and thence toward Missoula, Mont. The capital stock was placed at \$5,000,000.

Tobique Valley.—The company expects to begin track-laying in May on the first 14 miles from Perth, N. B., northeast to Trout Brook. The location will be completed by Sept. 1 on the next 14 miles to Plaster Rock when it is expected to begin construction. C. S. B. Mills, of Andover, N. B., is Chief Engineer.

Toledo & Ohio Central.—The company has filed in the office of the Secretary of State at Columbus, O., a resolution of the stockholders increasing the common stock from \$1,600,000 to \$1,857,000.

Western Maryland.—The ordinance granting the Western Maryland permission to build an independent line to tide-water, and to construct terminals of its own in the southern section of the city of Baltimore, has passed both branches of the City Council and received the approval of the Mayor. The company has been paying the Baltimore & Potomac and Northern Central companies for the use of tracks about \$80,000 per annum, and owing to the enlarged business of the company, the rentals were steadily increasing.

Wyoming, Salt Lake & California.—The contract for grading the first 10 miles of this road east from Salt Lake City has been let to James Durwender. This line is to form part of the Salt Lake, Nevada & California, of which 20 miles is under contract. Theodore Brough, of Salt Lake City, is Secretary of both companies.

TRAFFIC AND EARNINGS.

The Inter-state Commerce Commission.

OPINION ON PARTY TICKETS.

In response to the questions presented by the Trunk Line, New England, Southern Passenger, Western States Passenger, Transcontinental and International associations at the conference of March 21 the Commission made a ruling on Section 3 and Section 22 of the Inter-state law, in which it is said:

"This question brings up a practice which has long prevailed of giving to theatrical troupes and other similar bodies of persons lower rates when they go in a body than are given to the public generally. Some carriers, however, have gone beyond this, and have advertised party rates for ten or more persons which are considerably below the rates for single passengers. Any ten or more persons, it is understood, may accept the offer of lower rates by associating together for the purpose of the particular journey, though they may not otherwise be a party or even be known to each other. This of course affords an opportunity to ticket brokers, who, by procuring the requisite number of tickets, are enabled to peddle them out at some reduction on the regular rates to single passengers until the number is made up, and at the same time make a satisfactory profit to themselves. Between important cities like Pittsburgh and Philadelphia, or St. Louis and Chicago, no reason is apparent why under this system the business of supplying tickets to individual passengers should not fall for the most part into the hands of the brokers. The practice is vicious in conception and demoralizing in its effects; it necessarily works a discrimination against the single passenger who purchases his ticket at the regular office and in favor of the customer of the broker. Why any carrier should desire to continue it is not obvious. If only one carrier or a few should practice it, some advantage might be gained thereby over others; but if all practice it, even this excuse would be wanting. What defense there can be for the practice in law nobody on the conference undertook to point out."

It will be remembered that the Pennsylvania and the New York Central have recently extended the use of a class of party tickets, which is apparently condemned as "vicious" by this opinion. The trunk line passenger agents have agreed to abolish inter-state one-way party rates, and have asked the commission for a more explicit opinion on the legality of the tickets in question.

The Inter-state Commerce Commission has this week heard arguments in the case of William H. Heard (colored) against the Georgia Railroad Company. Heard claims that on a first-class ticket from Philadelphia to Atlanta he was obliged at one point to accept inferior accommodations in violation, he says, of the Inter-state Commerce law. Heard was complainant in a similar case eighteen months ago, which was decided against the company, and the Commission then ordered the company to desist from subjecting colored passengers to such prejudice. Petitioner brings this charge so as to obtain a supplemental order from the Commission mandatory and effectual in character.

Traffic Notes.

By the new organization of the Central Traffic Association provision is made for including lines as far west as the Mississippi.

The Cincinnati, Indianapolis, St. Louis & Chicago, which withdrew from the Central Traffic Association about six months ago, will rejoin the association May 15.

The Freight Committee of the Central Traffic Association has decided that all shipping receipts or dray tickets should have printed upon them in full the terms and conditions upon which the property is to be transported, and that the terms and conditions should be as per form adopted by the Middle and Western States Association.

The Union Pacific has reduced freight rates from Lincoln, Neb., to way stations tributary to that city, to a basis which is intended to remove any disadvantage as compared with Omaha, under which this city has heretofore labored.

A St. Paul dispatch states that some of the Lake Superior Transit Co.'s steamers will this season run to and from Gladstone, Mich., making connections with the Soo Line.

The Railroad Commissioners of Kansas have promulgated a new coal tariff for the roads of the state by which most of the rates are reduced. The tariff goes into effect May 1, and the reductions vary from 1 to 4 cents per 100 lbs.

The Western States Passenger Association, after considering the amendments to the Inter-state Commerce law concerning the posting of joint passenger tariffs, has decided to largely reduce the number of points to which tickets will be sold. It is said that the present list will be cut down nine-tenths.

The Chicago & Atlantic has complained to the Inter-state Commerce Commission that its western connections, in selling through tickets to the East over its line quote the rates which are in force over the older lines from Chicago, whereas the roads east of Chicago have agreed that the Chicago & Atlantic should have a differential of \$1.50 between Chicago and the seaboard. It is not stated whether the surplus is retained by the selling road or is forced upon the Chicago & Atlantic. Chairman Cooley writes a letter in response, simply saying that no road has a right to name a rate over another except such as is approved by the latter road.

A Chicago paper says: "The agents of the railroad pro-peller lines are badly puzzled, and they know not what to do. They have given, ever since they were established, through bills of lading to the seaboard and to Liverpool on grain. Their rates fluctuated to correspond with the fluctuations in lake grain freights to Buffalo. By the amended Inter-state Commerce law, requiring notice of advances and reductions, this practice is rendered illegal."

The agreement of the roads in Trunk Line and Central Traffic Association territory not to pay commissions on the sale of tickets is not to go into effect until May 1. The New England roads have instructed their agents not to accept commissions.

New England Board of Presidents.

The six principal roads of New England having western connections have formed an organization similar to that of the trunk lines and will act with the "Joint Committee" provided for by the trunk line agreement. The plan of organization has been signed by all the interested companies except the New York, New Haven & Hartford. President Clark could not attend the final conference of the roads, but there is said to be no doubt of his willingness to affix his signature. The agreement has been formally approved by President William Bliss, of the Boston & Albany; President E. B. Phillips, of the Fitchburg; President J. Gregory Smith, of the Central Vermont; Traffic Manager E. P. Vining, of the New York & New England, and General Manager James T. Furber, of the Boston & Maine.

A freight committee of the traffic managers or general freight agents and a passenger committee of the traffic managers or general passenger agents of the roads are appointed by the board of presidents to execute detail work. The freight committee consists of John Porteous, Through Freight Manager of the Central Vermont; Traffic Manager E. P. Vining, of the New York & New England; General Traffic Manager Whitmore and General Freight Agent Hartwell, of the Fitchburg; General Traffic Manager Mills and General Freight Agent Chapin, of the Boston & Albany; General Freight Agent Rockwell, of the New York, New Haven & Hartford, and General Freight Agent W. F. Berry, of the Boston & Maine. The passenger committee consists of the general passenger agents of the six roads.

The chairman of the board of presidents is William Bliss, of the Boston & Albany. The agreement takes effect April 4, and statistics are to be forwarded regularly to Commissioner Fink. The rail and lake freight tariff to the West for the present season has already been agreed upon, and in addition to the usual differential allowed the Central Vermont, a smaller one is allowed the Fitchburg and the New England, the Boston & Albany thus being the only line maintaining full rates on this traffic. It is understood that Commissioner Fink is authorized to order a modification of the tariffs if these differentials result in an undue gain or loss to any road. The tariff is as follows:

From Boston to—	1st.	2d.	3d.	4th.	5th.	6th.
Lake Michigan points.....	54	47	37	27	23	20
Lake Erie points.....	49	42	33	23	20	17
Differential.....						
Via Central Vermont.....	10	8	6	4	3	2
Via Fitchburg.....	5	4	3	2	1 1/2	1
Via New York & New England.....	5	4	3	2	1 1/2	1

Freight Rates on Anthracite Coal.

The Pennsylvania, Reading, Central of New Jersey, Lehigh Valley, New York, Lake Erie & Western, Delaware, Lackawanna & Western, and Lehigh Coal & Navigation roads have made the following reductions in the rates on anthracite coal: Ten cents per ton on prepared sizes from the Wyoming region to Philadelphia, and five to twenty cents on pea, buckwheat and ulm. Fifteen cents from the Wyoming region to New York on prepared, five on pea, and twenty on buckwheat. From the Lehigh region, ten cents reduction on prepared, and twenty cents on buckwheat, to New York and Philadelphia. Twenty-five cents reduction on all sizes to Buffalo and the bridges, and corresponding reductions to Lake Ontario ports and New York state ports; and fifty cents reduction to Chicago. The reductions are to take effect April 15.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, April 6, amounted to 45,577 tons, against 56,974 tons during the preceding week, a decrease of 11,397 tons, and against 54,375 tons during the corresponding week of 1888, a decrease of 8,798 tons. The proportions carried by each road were:

	W'k to Apr. 6.		W'k to Mar. 30.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	4,344	9.5	5,657	9.9
Wabash.....	4,813	10.6	4,549	8.0
Lake Shore & Michigan South.....	4,557	10.0	6,659	11.7
Pitts., Ft. Wayne & Chicago.....	5,757	12.6	5,766	10.1
Chicago, St. Louis & Pitts.....	6,134	13.5	6,325	11.1
Baltimore & Ohio.....	2,345	5.1	2,977	5.2
Chicago & Grand Trunk.....	9,912	21.8	13,518	23.8
New York, Chic. & St. Louis.....	2,895	6.3	4,633	8.1
Chicago & Atlantic.....	4,800	10.5	6,888	12.1
Total.....	45,577	100.0	56,974	100.0

Of the above shipments 2,658 tons were flour, 13,388 tons grain, 2,767 tons millstuff, 3,632 tons cured meats, 1,863 tons lard, 9,591 tons dressed beef, 1,584 tons grass seed, 837 tons butter, 1,689 tons hides, 120 tons wool, and 5,210 tons lumber. The three Vanderbilt lines carried 25.8 per cent. of all the shipments, while the two Pennsylvania lines carried 26.1 per cent.